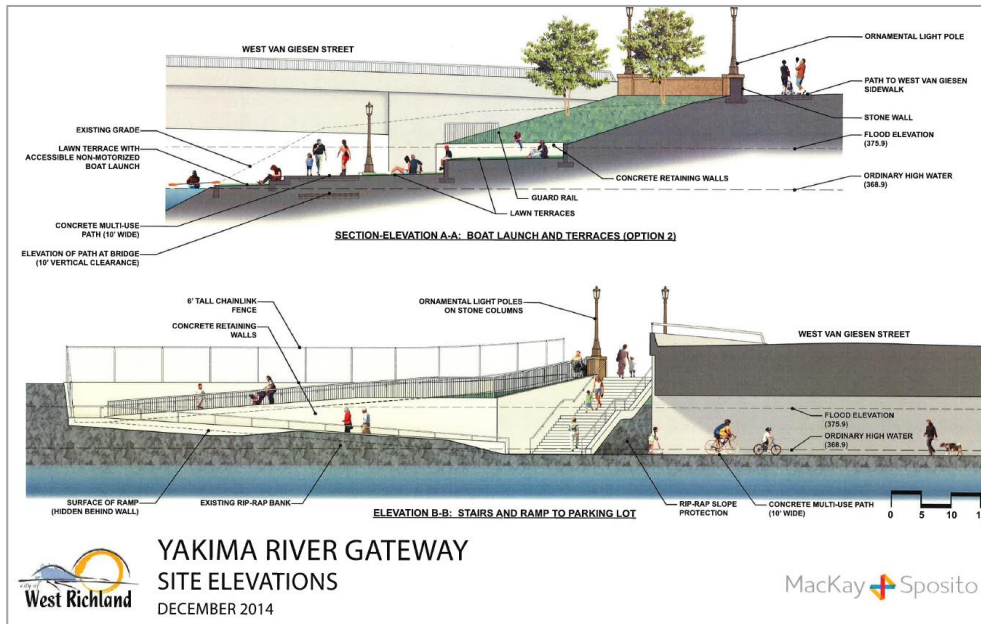


# Yakima River Gateway Project

## Environmental Assessment

### Benton County, Washington



*Prepared for:*

US Army Corps of Engineers  
City of West Richland and  
MacKay & Sposito

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# 1 INTRODUCTION

## 1.1 Introduction

The U.S. Army Corps of Engineers, Walla Walla District (Corps), proposes to approve alterations, pursuant to 33 USC 408 (Section 408), to a Corps-constructed levee in the City of West Richland (City). (Figure 1-Vicinity Map). The proposed modifications include an access ramp, stairs and flood wall in place of a section of the existing levee. The City's Yakima River Gateway Project (Project) would impact approximately 120 linear feet of this levee located to the south of the Van Giesen Street Bridge. The City's proposed modifications include an access ramp, stairs and flood wall in place of a section of the existing levee. The levee modifications are needed to provide non-motorized access from a proposed trailhead and parking lot on the south side of the bridge, under the Van Giesen Street Bridge to the proposed recreational facilities on the north side of the bridge including, a non-motorized boat launch, a park with an overlook and a recreational trail. The proposed flood wall would provide additional structural integrity to the existing Corps levee to offset modifications for the ramp and stairs. The ramp and stairs are needed because ADA access and facilities are a state funding requirement. The modifications would require excavating the existing levee to an elevation of 364 ft. The levee would then be re-constructed using a combination of common borrow backfill, concrete paving, concrete floodwalls and the concrete stairs. The top elevation of the levee would be retained.

The levee was constructed by the Corps in 1963 to prevent flooding in the City of West Richland. The levee extends from the south side of the existing Van Giesen Street (Highway 224) Bridge for approximately 5,760 linear feet along the west bank of the Yakima River. The City acquired the portion of the levee that would be affected by the proposed project from the Diking District through a Quit Claim Deed. The Diking District remains ultimately responsible for operation and maintenance (O&M) of the Yakima River West Richland Control Project, but the City has an inter-local agreement with the Diking District to perform the O&M for the subject levee section. O&M must comply with the Corps Operation and Maintenance Manual for the Yakima River West Richland Control Project, and any amendments or regulations adopted by the Corps for levee projects. The City would be responsible for construction, operation, maintenance, and repair of park, recreational facilities and amenities on that portion of the right-of-way deeded to the City.

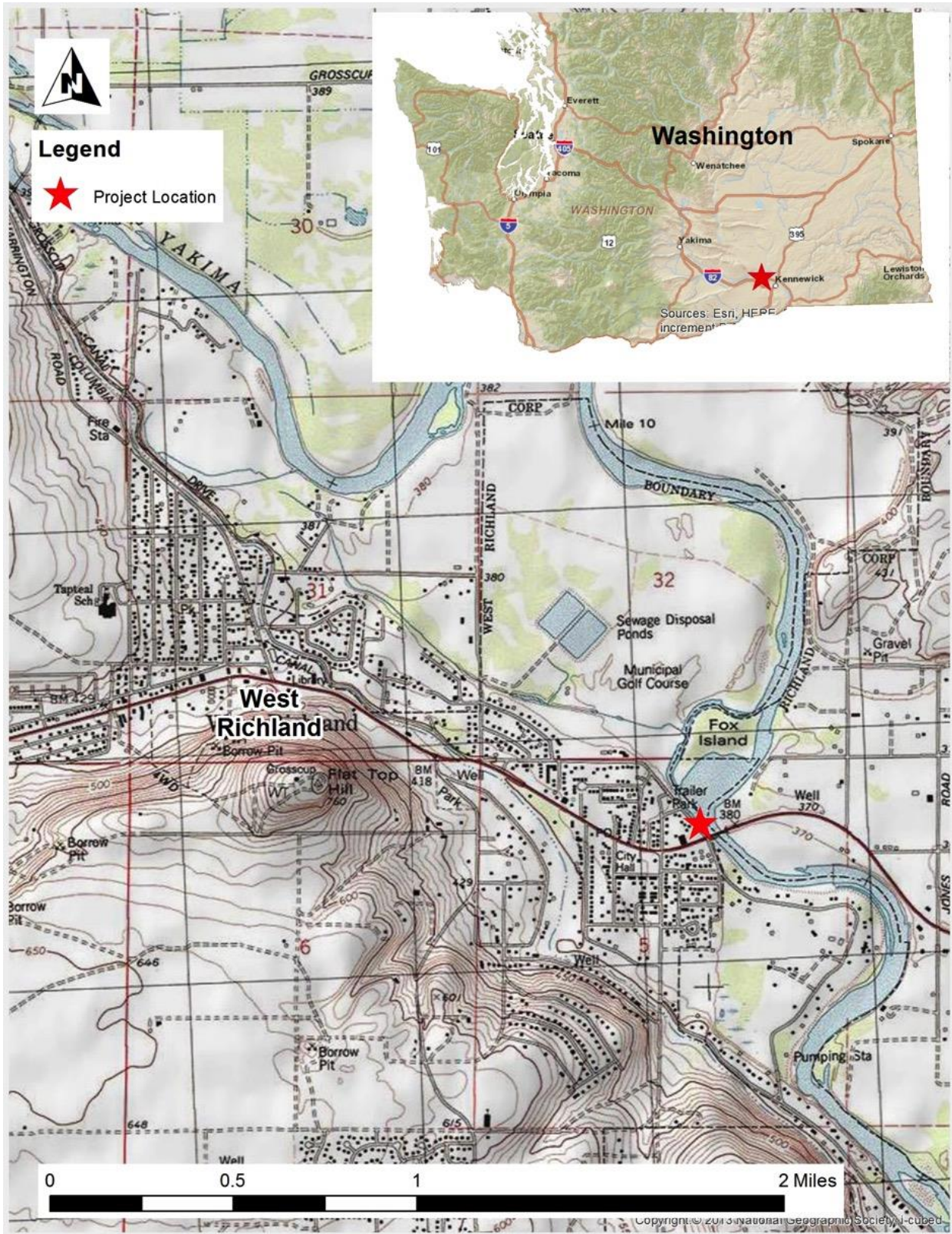
The modifications to the Corps-constructed levee require a Section 408 approval from the Corps and must be reviewed in accordance with the National Environmental Policy Act (NEPA) and other applicable

environmental laws and regulations. This Environmental Assessment (EA) was prepared in accordance with 33 CFR Part 230, *Procedures for Implementing NEPA*, and the Council on Environmental Quality (CEQ) *Regulations for Implementing the Procedural Provisions of NEPA*, [CFR 40 Part 1500-1508]. The objective of the EA is to evaluate potential environmental effects of the proposed Project. If after detailed evaluation the effects are not considered to be significant, the Corps would issue a Finding of No Significant Impact (FONSI). If the environmental effects are determined to be significant, an Environmental Impact Statement (EIS) would be prepared before a decision is reached regarding issuing a Section 408 permission for the proposed modification. This EA also evaluates compliance with other applicable federal laws, regulations and Executive Orders (EO).

## **1.2 Proposed Project Location**

The Project is located within the City of West Richland, in Benton County, Washington along the west (right) bank of the lower Yakima River and along a side channel of the river. It is in Township 9 North, Range 28 East, and Section 5. See Figure 1. Vicinity Map. . The Project would affect a 120-foot section of levee located on the south side of the Van Giesen Street Bridge. The levee also extends further south of the bridge through a fenced area which is restricted to public access but there would be no proposed work in that area. For the purposes of this EA, the footprint for the effects analysis includes approximately 1,300 foot of shoreline between the proposed trailhead south of the Van Giesen Street Bridge to the northern extent of the trail just south of Fallon Drive near the West Richland Golf Course.

Figure 1. Vicinity Map





### **1.3 Purpose and Need**

The **purpose** of the proposed project is to enhance recreational opportunities along the Yakima River shoreline in West Richland. The project area is City-owned land and is a popular access point for non-motorized watercraft (kayaks, inner tubes, and canoes) accessing the Yakima River in the City of West Richland. The proposed project must maximize recreation opportunities, be technically feasible (e.g., design, cost, etc.) and minimize adverse socio-economic and environmental effects. The project is also intended to provide a distinct gateway to the City of West Richland with an attractive and suitable location for gateway signage for the City. The project is **needed** because, in its existing condition, the shoreline is undeveloped and offers limited access for those that can't maneuver the rocky slopes and terrain. None of the current features are American Disabilities Act (ADA) compliant. Existing watercraft access is in an unofficial and undesignated takeout point, which disturbs wildlife and adversely affects wetland and shoreline vegetation. The current access to the shoreline is adjacent to residences and businesses that complain of littering, trespassing, urinating and illegal parking and other associated issues. Locating the trailhead south of the Van Giesen Street Bridge would move these activities further away from these residences and businesses to help to address these concerns. Restroom and waste facilities at the trailhead are needed to further minimize these social and environmental impacts. The ramp and stairs are needed because ADA access and facilities are important and a funding requirement.

#### **1.3.1 Watercraft access**

The Project area attracts kayak and canoe enthusiasts seeking non-motorized watercraft access to the Yakima River. However, there are no designated access sites within this reach. The wetland to the north of the Van Giesen Street Bridge is used as an informal take out and launch area. Boaters have also accessed the river further downstream in other undefined areas. These undeveloped launching areas are often muddy, causing difficult conditions for boaters and heavy damage to wetland vegetation and soils. Additionally, the current is swift in this area making it difficult to maneuver for takeout or launching.

#### **1.3.2 Access for Handicapped and Non-Handicapped Visitors**

There is currently no ADA access across or under Van Giesen Street to reach the informal take out and launch area. Crossing Van Giesen Street at this location is not safe. The Washington State Department of Transportation (WSDOT) has stated that they do not want a pedestrian crossing at this location due to poor visibility and vehicular speeds, which cause a safety hazard.

### **1.3.3 Parking Accommodations**

The Project area lacks public parking opportunities. There are no designated parking spots for visitors wanting to access the river and park property. There were three parking spaces located along Fallon Drive and Butte Road; however, that road was recently removed and no additional parking locations were added. The public currently parks in the cul-de-sac located on the south side of the Van Giesen Bridge, along the adjacent residential streets, and within the neighboring business parking lots, which causes a nuisance for the local residents and businesses. Parking along the southern side of the Van Giesen Street Bridge creates a public safety hazard when the public crosses the highway to access the river, often carrying watercraft.

### **1.3.4 Park Facilities**

No park currently exists within the Project area. The property on which the proposed Project would be built upon is undeveloped, City-owned land designated for recreational use. The park facilities proposed for the project include a trail along the western edge of the Yakima River north of the Van Giesen Street Bridge, non-motorized boat access, and a trailhead with parking and restrooms available. The proposed park would also be ADA compliant and would have additional features including lighting, interpretive signage, resting areas, entry monument signage, and passive open areas. This would enhance recreational activities in the project area.

## **1.4 Proposed Project**

The proposed Yakima River Gateway Project (Project) would address the needs described above by developing the park which would provide ADA facilities, parking, restrooms, a trail connecting parking to the trail and by providing designated shoreline access, recreational and educational facilities. It would consist of a trailhead to be constructed on the south side of the Van Giesen Street Bridge with 52 parking spaces, a restroom, stormwater treatment and a 10 to 12 foot wide trail that begins at the trailhead, descends on a ramp that crosses underneath the Van Giesen Street Bridge. The trail then continues northward along the shoreline until it terminates south of Fallon Drive. A designated non-motorized watercraft access and an overlook would be constructed just north of the bridge to reduce impacts to the shoreline and allow safer and improved access. The Project would have ADA-compliant features. It would have stairs, sidewalks, ramps, interpretive signage, resting areas, entry monument signage, and passive open areas. Lighting would be provided, but it would be a day use only park.

Landscaping and mitigation plantings would be installed along the trail and in areas along the shoreline. See Appendix A, Design Plans.

The Project would impact approximately 120 linear feet of the levee. The levee modifications are needed to provide non-motorized and ADA access under the Van Giesen Street Bridge from the trailhead parking lot (restrooms and parking) (Figure 2 through Figure 4) to the recreational trail that would provide access to non-motorized boat launch, a passive park with an overlook, and a trail that extends north of the bridge (See Figure 4 and Figure 5). The City determined that developing the trail underneath the bridge was the least expensive and least impacting method to provide a safe crossing of Van Giesen Street. WSDOT allows public access under the bridge if a minimum 10 foot clearance is maintained; therefore, it is necessary to cut into the bank, including the earthen levee on the south side of the bridge, to gain an additional elevation of 13 feet for an acceptable grade to the top of the levee structure. This would require excavating the existing levee to an elevation of 364 feet then reconstructing it using a combination of common borrow backfill, concrete paving, concrete flood wall and the concrete stairs. The flood wall would provide additional structural integrity to the existing levee to offset modifications for the ramp and stairs. Also see Appendix A, Design Plans and Appendix D, Geotechnical Report. All work would be performed per the geotechnical report recommendations and project contract documents. Construction adjacent to the shoreline would occur during the Washington Department of Fish and Wildlife (WDFW) in-water work window, which is August 1 to September 30 as indicated in the Hydraulic Project Approval.

## **1.5 Authority**

The Corps is proposing to approve the Corps-constructed levee alterations, pursuant to 33 USC 408 (Section 408). The Benton County Diking District No. 1 is the non-federal sponsor for this levee, as they ultimately have operation and maintenance responsibility, pursuant to the agreement with the Corps, titled *Resolution Benton County Diking District No. 1* and dated May 28, 1963. The City of West Richland may request and perform an alteration, but the Diking District must endorse the request. Approval for any alteration, however, would be obtained by the Diking District.

Figure 2. Trailhead, South of Van Giesen Street Bridge

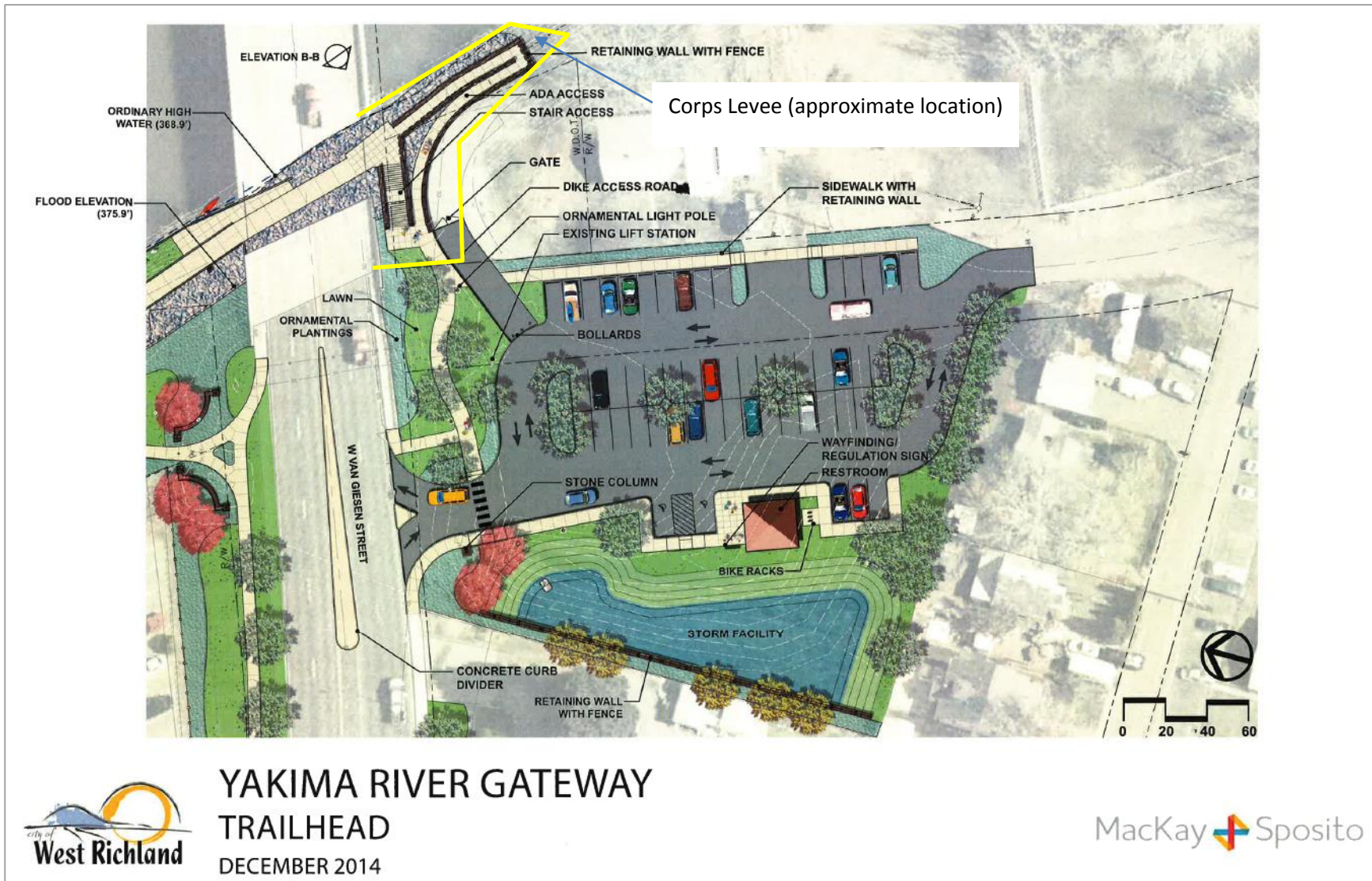


Figure 3. Site Elevations at Van Giesen Street Bridge

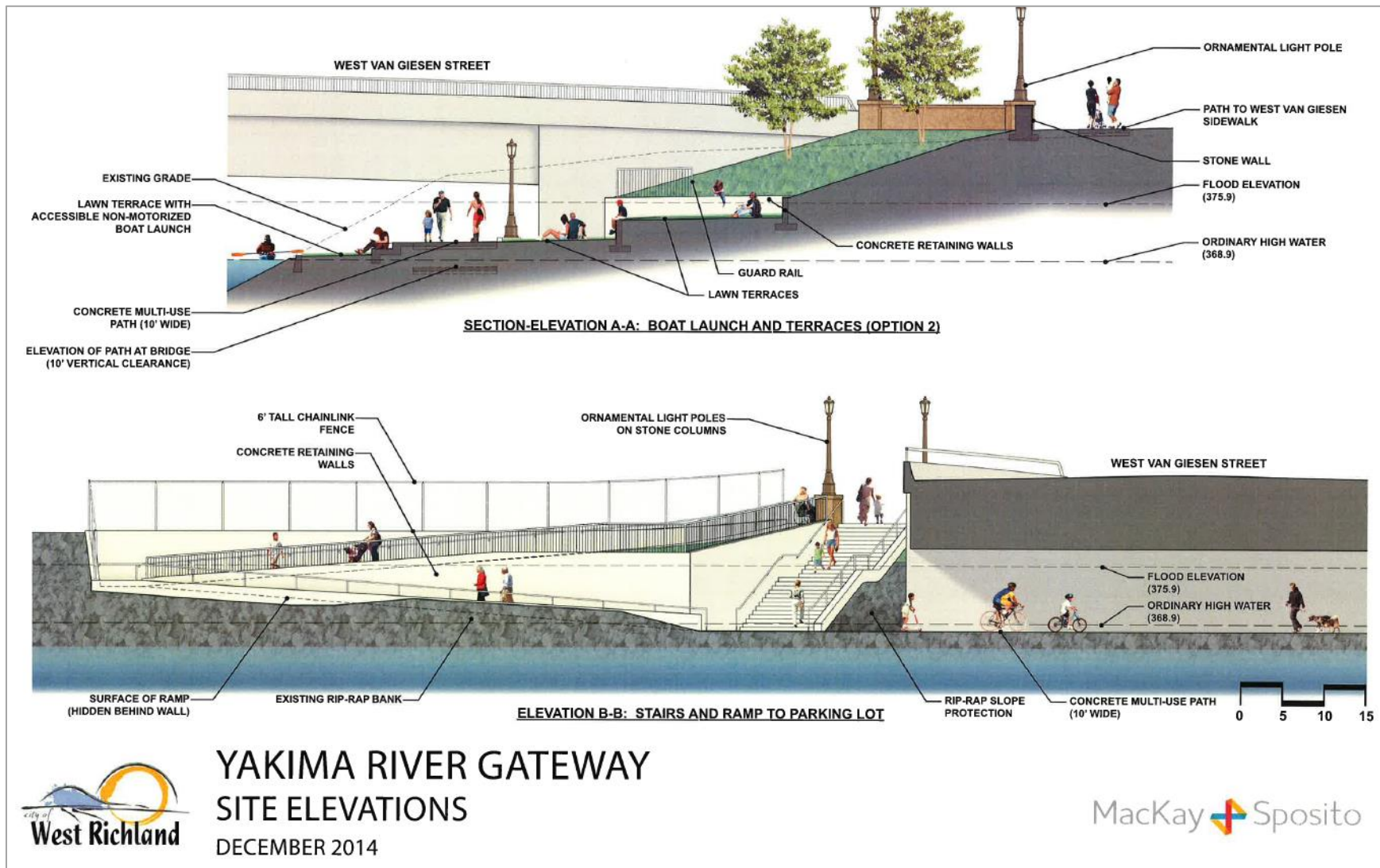
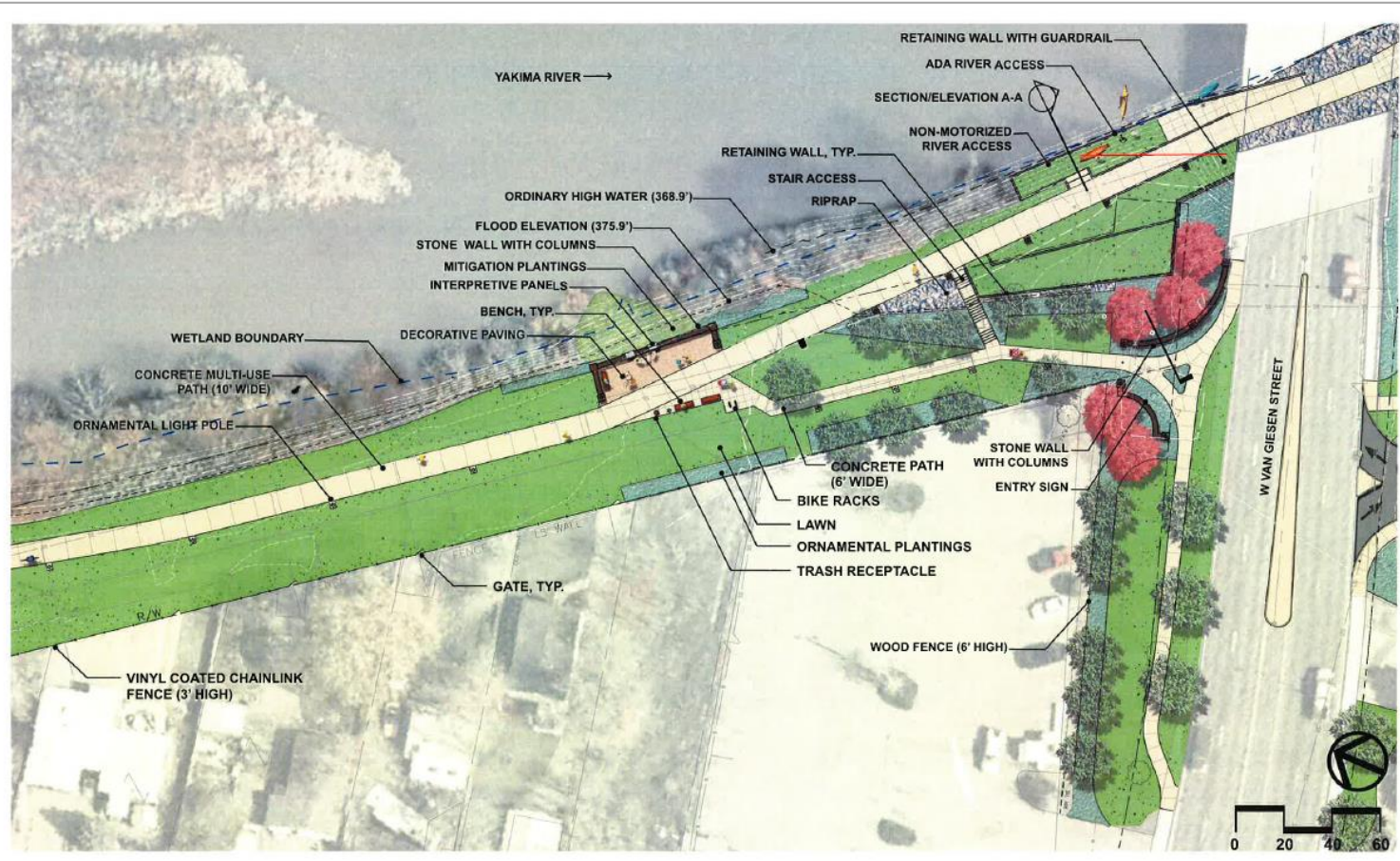


Figure 4. Overlook, Watercraft Access and Trail, North of Van Giesen Street Bridge



**YAKIMA RIVER GATEWAY**  
**OVERLOOK - OPTION 1**  
 DECEMBER 2014



Figure 5. Trail, North of Overlook



**YAKIMA RIVER GATEWAY**  
**RIVER TRAIL**  
DECEMBER 2014



## **2 ALTERNATIVES CONSIDERED**

### **2.1 Introduction**

The National Environmental Policy Act (NEPA) and 33 CFR Part 230 *Procedures for Implementing NEPA* require consideration of a range of reasonable alternatives during the planning process. Alternatives considered under NEPA must include, at least, the Proposed Project and the No Action Alternative. The No Action Alternative provides a baseline from which to compare other alternatives.

### **2.2 Alternatives Considered But Not Carried Forward for Detailed Analysis**

This section discusses concepts that were evaluated during the early project planning, but were not carried forward for additional analysis, since these alternatives would have greater environmental impacts, excessive costs and/or adverse socio-economic effects.

#### **2.2.1 North Trail Concept**

Conceptual design for this trail started in 2012. At that time the trail would have started on the north side of the Van Giesen Street Bridge. It would have consisted of a 12-foot wide concrete trail, educational kiosk, restrooms, a floating dock/boat launch, and an interpretive overlook over the water. The trail would have followed the shoreline with an alternate route extending along the previous Fallon Drive, west onto Butte Court then North along 38<sup>th</sup> Ave. where it would have connected with the trail/berm system along the shoreline south of the West Richland Golf Course. See Figure 6. Early Concept Not Evaluated in Detail (2012). This concept was eliminated based on increased environmental effects due to the high level of impacts to wetlands and the shoreline when compared to recreational benefits. The project would have impacted approximately two tenths of an acre of wetlands and would have encroached on a similar amount of floodplain. It would have displaced homes and commercial properties within the proposed trailway corridor. It would have had greater riparian impacts and involved in-water construction resulting in an adverse effect to salmonids and other wildlife. The parking lot, stormwater area, trailhead and restrooms would have been located north of the bridge, which would have also displaced commercial properties and residences.



### 2.2.2 The Longer Trail Concept

In 2014 the project was also envisioned as a longer trail system extending from south of the Van Giesen Street Bridge, north, past the current project limits and would have followed the shoreline on an existing levee on the eastern edge of the West Richland Golf. Potential improvements included a fishing pier extending over the water, a trailhead, boat launch and other associated facilities. See Figure 7. Early Concept Not Evaluated in Detail (2014). This concept was eliminated based on feasibility (excessive cost) and adverse socio-economic (rights-of-way issues) and environmental (wetlands and floodplains) effects. It would have impacted nearly one acre of wetland. Approximately 3,000 feet of trail and berm would have encroached on the floodplain. There would have been greater impacts to riparian habitat and in-water construction that would result in an adverse effect to salmonids and other wildlife. In addition, the trailhead for the park was proposed to be located in the Golf Course Parking lot, which is privately owned. Agreement regarding use of that property for a trailhead could not be reached. These environmental and right-of-way factors would have required extensive negotiation and a high level of project permitting and mitigation which would have extended beyond the two year time limit to use the RCO funding. This proposal was redesigned and scaled back to what is presented as the Proposed Project.

### 2.2.3 The North Side Concept

This concept involved locating the parking and bathroom on the north side of the bridge. The north side of the bridge consists of residences and businesses that are very close to the shoreline and there would be residential and business displacements required to accommodate the parking lot and restrooms. Locating the parking, stormwater treatment areas and restrooms on the north side of the bridge would require demolishing many homes, trailers, displacing businesses and would result in a major community and economic impact. Since the south side of the bridge already has a large cul-de-sac, an existing stormwater pond and is less developed, residential and business displacements could be avoided resulting in less community impact and less economic burden. This concept was eliminated based on feasibility (excessive cost) and substantial adverse socio-economic effects.

### 2.2.4 Van Giesen Crossing Concept

A pedestrian and bicycle crossing over Van Giesen Street would involve constructing a bridge structure with at least 17 foot clearance over Van Giesen Street with less than a five percent grade. It would require an approximate 100 foot span to have a clear span over the highway. There would be approximately 340 foot of 14 foot wide pathway on both sides of the road and would require

switchbacks to achieve the appropriate grades. This concept would require acquisition of additional properties within the shoreline and additional residential displacement north and south of the bridge to allow for sufficient area to accommodate the low gradient ramps needed for ADA, pedestrian and bicycle access. This crossing would create a substantial visual impact to the shoreline by constructing the pedestrian overpass structure parallel to the Yakima River and obstructing the views to the shoreline. The majority of the shoreline would be impacted to accommodate the overcrossing, associated pathways and ramps, leaving little remaining shoreline for recreational use. In addition, this large structure within 200 feet from ordinary high water mark would be in the shoreline jurisdiction and shoreline buffer, which would not likely be consistent with or permitted under the City of West Richland Shoreline Master Program. There would be additional visual impact if more impervious surface, in addition to the cul-de-sac, was required for parking. In addition to the societal, visual, and shoreline impacts, building a bicycle and pedestrian bridge over the highway was estimated to cost approximately \$2.5 million and was considered too expensive. This concept was, therefore, eliminated based on feasibility (cost) and substantial adverse socio-economic effects.

Figure 6. Early Concept Not Evaluated in Detail (2012)



**City of West Richland**  
**Developing Yakima Riverfront and Trail**  
**RCO Project: #12-1566**

**Site Plan**

**LEGEND**

- River Access Acquisition Taxlots
- Taxlots
- City Limits

JUL 2012

0 Feet 200

SERA West Richland

Figure 7. Early Concept Not Evaluated in Detail (2014)



## **2.3 Alternatives Forwarded for Detailed Evaluation**

### **2.3.1 No Action (Current Practice)**

The existing informal shoreline access and use of the Yakima River in the City would continue to be limited with the No Action. The City-owned land would remain unimproved and there would be no park facilities or trails developed at this location. Recreational users would continue to park in residential or commercial areas, creating a nuisance for neighboring residents and businesses. People accessing the river or shoreline would continue to cross the highway either over or under the bridge causing a public safety hazard.

There would be no trailhead or restrooms and the property would remain limited in its use and would not accommodate handicapped users. The route from the south side of the bridge would continue to present a steep rocky access and would exclude handicapped persons from using the trail or accessing the river either for viewing or watercraft access. The informal watercraft pullout area would continue to be used but would continue to be muddy and difficult to access.

There would be no trails and the properties would remain as grass and gravel with limited recreational and educational value. The non-native trees and shrubs would remain, the levee would not be improved and landscaping would not be installed; however, the existing grasses would continue to be fertilized and mowed.

The No Action Alternative does not meet the project purpose and need; however, it is carried forward for comparative analysis as required by NEPA.

### **2.3.2 Construct Yakima River Recreational Trail (Proposed Project)**

#### **2.3.2.1 Description of Proposed Project**

The Yakima River Gateway Project would consist a 10 to 12-foot wide multi-use recreational trail on the right bank of the Yakima River beginning at the ramp located on the south side of the Van Giesen Street Bridge (SR 224), crossings under the bridge, then continuing along the shoreline to the intersection at Fallon Drive.

A trailhead would be located on the south side of the Van Giesen Street Bridge with 52 parking spaces to alleviate parking impacts to the surrounding neighborhood and businesses. Amenities would include a restroom, bike racks, trash receptacles, and stormwater treatment areas. A ramp and stairs would be constructed at the beginning of the trail that would connect the parking lot to the trail just before it

goes under the bridge. The ramp would be designed to meet ADA requirements. The soil under the bridge would be removed sufficiently to allow adequate 10-foot vertical clearance for bicycles and pedestrians. 24-hour lighting would be provided under the bridge although it would be a day-use only park. The trail would continue north along the shoreline for approximately 1,050 linear feet until intersecting with Fallon Drive just south of the West Richland Golf Course. This trail would provide a connection to the non-motorized watercraft launch area, which would have ADA features. An interpretive overlook and terraced passive recreation areas would expand the recreational use of the park. See Figures 2 to 5 for visualizations of the proposed improvements.

Access from the parking lot to the trail under the bridge would require constructing stairs and an accessible ramp to comply with ADA requirements, which would affect the existing Corps-constructed levee located south of the bridge. Constructing the stairs and accessible ramp would require temporarily removing up to 50% of the material from the water ward side and top of the existing levee; constructing concrete retaining walls, ramp surface, and stairs; then backfilling with appropriate materials. The impact area would be approximately 100 feet in length mainly due to the length of the required ramp, which would require one switch back and wall heights ranging from 3 feet to 10 feet. Guards and handrails would be provided for safety on both the stairs and ramp. Maintenance access to the levee would be maintained during construction and new fencing and gates would be installed to limit access to the levee. There would be no in-stream work or work waterward of the ordinary high water mark (OHWM). Riprap removed during excavation of the levee section would be reused in the construction of the proposed flood wall by placing it along the stream bank above the level of the existing riprap on the levee and under the bridge. See Appendix A. Design Plans.

### **2.3.2.2 Landscaping and Mitigation**

There is currently no vegetation on the section of levee that would be modified and there would be no vegetation planted on the levee after construction of the flood wall, stairs and ramp.

During construction of the proposed trail, six mature non-native trees and shrubs would be removed along the shoreline north of the bridge outside of the Corps-owned levee; however, over 400 native trees and shrubs would be planted within the City-owned property as part of the Yakima River Gateway Project. Planting locations are shown on the landscape plans. See Appendix A, Design Plans. All planted areas identified would provide some degree of wildlife function.

### 2.3.2.3 Construction Schedule

The project construction is estimated to begin in May 2016 and would be completed by November 2016 with possible extension to spring of 2017. While there is no in-stream work for this project, the Washington Department of Fish and Wildlife (WDFW) in-water work window is August 1 to September 30 and is likely to apply to work immediately adjacent to the water as well. The stairs, ramp and flood wall would be constructed at the same time and would occur during the in-water work window. The timing for construction activities is shown in Table 1. Construction Activity Timing.

**Table 1. Construction Activity Timing**

<b>Construction Activities</b>	<b>Timing</b>
Remove road asphalt, construct stormwater area and install utilities	June-July 2016
Construct restroom, trail, parking lot, overlook, and signage.	July-October 2016
Construct levee modifications including stairs and ramps, and site fencing.	August-September 2016
Demolition and construct non-motorized watercraft features, place riprap, excavate levee and construct concrete flood wall	August-October 2016
Construct ramps, sidewalks, terrace, and paths	August-October 2016
Complete erosion control seeding, landscaping and mitigation plantings	September-October 2016
Project completed	November 2016

## 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section discusses the existing environmental conditions of the study area and the effects of the No Action and the Proposed Project and Proposed Project on the natural and built environments. For the purposes of this EA, the project study area is the location of the trail from the trailhead to Fallon Drive extending to the edge of the residential and business developments.

### 3.1 Environmental Setting and Land Use

The land use surrounding the project area is commercial, residential, and road right-of-way. Except for the existing riparian vegetation on the north side of the project area, the majority of the site is disturbed.



Photo 1. Levee south of bridge, facing south



Photo 3. Gravel roadway north of bridge, facing south.



Photo 2. Underside of bridge, facing north



Photo 4. Wetland A, facing northeast

## 3.2 Aesthetics/Visual Resources

### 3.2.1 Affected Environment

The Yakima River Gateway Project extends through undeveloped or vacant land along the shoreline of the lower Yakima River. The Corps levee south of the Van Giesen Street Bridge is an unvegetated gravel surface adjacent to a residential area, a cul-de-sac and stormwater treatment area. The trail would pass under the Van Giesen Street Bridge (SR 224) and abuts a commercial parking lot, residential areas and a trailer park north of the bridge. Previous and current developments adjacent to the property have diminished the aesthetics and the natural setting of the project. See Photos 1-4.



## **3.2.2 Environmental Consequences**

### **3.2.2.1 No Action**

The No Action Alternative would not have significant visual changes to or from the project area. Maintenance activities would be limited to trimming vegetation and mowing the existing lawn. The residential yard waste and garbage would likely continue to be deposited along the shoreline. The gravel road would likely mature to a sparsely vegetated grassy area. People would continue to litter and urinate in the area if no action is taken. The shoreline would continue to diminish the natural setting and aesthetics of the area.

### **3.2.2.2 Proposed Project**

Constructing the Yakima River Gateway Recreational Project would improve the overall aesthetics of the project area. See Figures 2-5 for Design Visualizations of the Proposed Project. There would be an increase in developed or hardened features to the landscape near the bridge by constructing the trail, overlook, gateway signage, retaining walls, ramps, stairs, sidewalks and the non-motorized access area. The repaving of the parking lot and restroom area would be in an area that is already paved and would not create a substantially greater visual impact except with the restroom facility, which would be a new feature in the landscape. Landscaping would help minimize the visual impacts and offset the hardened features such as concrete and asphalt. The proposed project would help provide access to public viewpoints to enjoy the river, which is expected to be an aesthetic improvement.

A 10 to 12-foot paved path would be constructed under the bridge and would have 24-hour lighting. The concrete stairs, ramp and concrete flood wall on the levee would be a change visually, however, the levee is currently graveled and unvegetated so the change is not expected to be an adverse visual effect. The hardened features are primarily near the roadway and bridge and while new, would be consistent with the more developed setting. These features and associated landscaping are expected to improve the view for the recreational users, improve the view towards the facility, and provide a more cohesive recreation area that would be considered by most to be an aesthetic improvement compared to the existing conditions.

### **3.3 Aquatic Resources**

#### **3.3.1 Affected Environment**

Fish species in the lower Yakima River with recorded occurrences include spring and fall chinook, coho salmon, summer steelhead, rainbow trout, and bull trout (WDFW Priority Habitat and Species (PHS) 2015). The habitat requirements for the species differ somewhat, but all share some common habitat needs to support life stages. Common habitat functions listed in *Land Use Planning for Salmon, Steelhead and Trout; A Land Use Planners Guide to Salmonid Habitat Protection and Recovery* include a stable incubation environment, cool, well-oxygenated and unpolluted water, cover, sufficient sources of prey, and unimpeded access to off-channel areas.

Smallmouth bass were introduced into the Yakima River in 1925 and are known to prey on salmonids in the lower Yakima River. They have surpassed the native pike minnows, which were historically the primary salmonid predator. Lampreys are also known to inhabit the lower Yakima. (Appel et al. 2011). Other fish species that may be present are mountain whitefish, chisel mouth, common carp, and peamouth (FHWA 2011).

Amphibians typically found in the area are Pacific tree frogs, bullfrogs, and painted turtles (WDFW 2015). Common aquatic insects in the river are mayflies, caddisflies, dragonflies, and stoneflies (Hafele and Hinton 2003).

The habitat for aquatic resources has already been affected by the introduction of dams and water diversion for irrigation. The two diversion dams on the lower Yakima River in Benton County have created fish passage barriers and increased predation at the diversion facilities. The dams also affect water temperatures and have changed substrates used for spawning.

This reach of the lower Yakima River is 303(d) listed and water quality impaired for DDT and turbidity. Impairment due to high pH and low dissolved oxygen levels has also been recorded in the immediate area (Ecology 2015).

#### **3.3.2 Environmental Consequences**

##### **3.3.2.1 No Action**

The No Action Alternative would be similar to the current condition where the shoreline buffer is used as residential back yards, parking areas or graveled lots, with areas of grass and primarily non-native trees.

Salmonids would continue to suffer from elevated water temperatures and impaired water quality as described. Erosion and vegetation disturbance from launching and taking out watercraft from the unimproved river access would continue to occur which could adversely affect aquatic habitat and the species it supports. The graveled roadway would provide no habitat but may eventually offer water quality treatment functions when the grass establishes. While the trees may be trimmed, they would likely remain and could provide more shade, which could contribute to lower water temperatures. The No Action alternative would create little or no additional impacts to aquatic resources.

### **3.3.2.2 Proposed Project**

The Yakima River Gateway Project would not involve work waterward of the OHWM and would not affect wetlands; therefore, would have minimal effect to aquatic species. While there would be work below the elevation of the OHWM when the concrete flood wall is being constructed on the levee, it would be landward of the levee. Work near the water would be during the low-flow periods between August 1 and September 30 to protect fish and aquatic species. During this time the river levels would be low and would not be near the construction area.

There may be potential to intercept high water tables during the excavation in the levee but any groundwater would be pumped to the existing upland stormwater treatment area for infiltration and would not affect water quality or impact aquatic species. There would be no vegetation or habitat changes on the Corps-levee as it is currently unvegetated; therefore, there would be no impact to aquatic resources from the modification of the Corps levee.

There would be no wetland impacts but there would be construction within the wetland buffers and shoreline buffers north of the bridge that could affect fish, amphibians or other aquatic species.

Removing the non-native trees and vegetation would temporarily reduce shade, could contribute to higher water temperatures, reduce soil stability, and reduce the availability of future woody debris recruitment important for stream structural diversity and food sources for fish. The six non-native trees slated for removal would be replaced with over 400 native species, which would improve wildlife habitat and shoreline habitat in the long-term.

Temporary soil disturbance during construction could increase erosion and sedimentation. Removing grass could temporarily reduce the toxicant/sediment removal function of the buffer area. However, since Fallon Road was removed from vehicular use it no longer generates pollutants. A Stormwater Pollution Prevention Plan (SWPPP) would be prepared and Best Management Practices (BMPs) would be

implemented. BMPs could include silt fence, fiber wattles, reseeding, and other soil stabilization measures.

Adding impervious surface could increase the quantity of runoff increasing scour along the shoreline; however, runoff along the trail is designed to drain away from the river and infiltrate into the soil. In addition, runoff from the proposed park and trailhead is unlikely to have vehicle related pollutants because the runoff flows to the stormwater treatment area.

### **3.4 Terrestrial Resources**

#### **3.4.1 Affected Environment**

A report titled *Yakima River Gateway Habitat Management Plan* (Anderson 2015a) describes the riparian area near the project as a wildlife biodiversity area. The treed riparian corridor, river and wetlands may be used by deer, bald eagle for wintering, great blue heron, beaver, small mammals, reptiles, amphibians and birds and provides waterfowl habitat. The project would be constructed in an area where development closely abuts the river and would be along the outside edge of the riparian corridor. Beaver activity has resulted in loss of some woody vegetation but mitigation plantings would replace some vegetation along the shoreline. The project area south of the Van Giesen Street Bridge includes an unvegetated gravel levee, a paved cul-de-sac, and a stormwater treatment area. North of the bridge is a lawn with some non-native trees along the shoreline and an intermittently steep riverbank. Further north the asphalt surfacing of Fallon Drive was removed and is now coarse gravel with fencing. Behind the mobile home park, the site is lawn adjacent to riparian vegetation with an adjacent wetland to the east.

#### **3.4.2 Environmental Consequences**

##### **3.4.2.1 No Action**

The No Action Alternative would have little direct effects on terrestrial resources or wildlife. There would be no anticipated tree removal, grass removal or other construction that could minimize terrestrial habitat. Trees would age, die and decay, eventually falling but these would be replaced with successional species. Non-native trees would remain and native trees and shrubs would not be planted. The riparian habitat behind the mobile home park receives yard waste and debris, which would likely continue to occur and degrade the habitat. The gravel road would remain but may be replaced with some grass, which would provide limited terrestrial habitat. There would be no designated overlook,

viewing areas or watercraft access so shoreline vegetation and soils that provide habitat would continue to be degraded.

### **3.4.2.2 Proposed Project**

Minimizing vegetation removal and planting native trees and shrubs would preserve the natural character of the shoreline, which could be used by terrestrial species. There would be no impacts to wetlands or floodplains. There would be no work at the water's edge, which could disrupt wildlife foraging.

Approximately 1,500 square feet of shoreline would be restored with native vegetation, which would provide future soil stability, shade, and wildlife habitat. The vegetation would also enhance connectivity and habitat functions in the project area and increase biodiversity. 2,525 square feet of pavement that was removed is expected to develop to lawn and landscaping which may improve the limited habitat connectivity in the area. (Anderson, 2015a).

Removing non-native vegetation near the shoreline may occur over a 3 to 5 year period and allow native plants to regenerate. A qualified biologist would locate nests during the nesting period to avoid disturbing active nests during construction. Trees would be checked for active nests prior to removal. The proposed project would not cause a significant effect to any terrestrial species or populations.

The existing Corps-levee is unvegetated with a gravel surface and there would be no vegetation or habitat changes that would affect terrestrial resources on the levee.

## **3.5 Threatened and Endangered Species**

### **3.5.1 Affected Environment**

On October 20, 2015, the official US Fish and Wildlife Service (USFWS) species (Consultation Code 01EWF00-2016-SLI-0055) and the National Marine Fisheries Service (NMFS) (NMFS 2015) lists were reviewed for listed and proposed threatened and endangered species, candidate species and proposed and designated critical habitat that may occur near the project area and/or may be affected by the alternatives. A report titled *Yakima River Gateway Project Biological Assessment* was prepared for the project and sent by the Corps to USFWS and NMFS on December 11, 2015 for informal consultation (Anderson 2015b). The report described the listing status; the available habitat and conditions for species listed in Table 2 – Federally Listed Species that May Occur in the Project Area.

### 3.5.1.1 Federally Listed Species

The species and designated critical habitat that could occur in the Project Area are listed in Table 2 – Federally Listed Species that May Occur in the Project Area.

**Table 2 – Federally Listed Species that May Occur in the Project Area**

<b>Species</b>	<b>Scientific Name</b>	<b>Status</b>	<b>Designated Critical Habitat?</b>
<b>Yellow-Billed Cuckoo</b>	<i>Coccyzus americanus</i>	Threatened	Proposed
<b>Northern Wormwood</b>	<i>Artemisia campestris var. wormskioldii</i>	Candidate	No
<b>Gray Wolf</b>	<i>Canis lupus</i>	Endangered	Yes
<b>Bull Trout</b>	<i>Salvelinus confluentus</i>	Threatened	Yes
<b>Middle Columbia River Steelhead DPS</b>	<i>Onchorhynchus mykiss</i>	Threatened	Yes

Source: (USFWS 2015a), (NOAA 2015) and (Yeager per. Comm. 2015)

### 3.5.2 Environmental Consequences

#### 3.5.2.1 No Action

The No Action Alternative would have no effect to ESA-listed species because there would be no proposed work or tree removal. Habitat diversity would continue to be limited by the dominance of non-native plant species and the adjacent developments.

#### 3.5.2.2 Proposed Project

The *Yakima River Gateway Project Biological Assessment* (BA) prepared for the proposed project is included as a technical report to this EA. Greg Van Stralen with USFWS was consulted on October 28, 2015 and Justin Yeager with NMFS was consulted on October 29, 2015 to discuss species listings, potential occurrences and the effects of the proposed project on the species that could be in the project area. The Corps submitted the Biological Assessment to USFWS and NMFS on December 17, 2015. As indicated in the Biological Assessment, there is a “no effect” determination to bull trout. NMFS concurrence was received January 7, 2016 and indicated “no adverse effect” to the Mid-Columbia steelhead. The effect determinations and NMFS concurrence letter are summarized in Table 3. Species Effect Determinations. See Appendix B, Biological Assessment.

**Table 3. Species Effect Determinations**

Species Common Name	Effect Determination	Critical Habitat Effect Determination
<b>USFWS</b>		
<b>Bull Trout</b>	NE*	NE
<b>Gray Wolf</b>	NE*	NE
<b>Yellow-Billed Cuckoo</b>	NE	NE
<b>Northern Wormwood</b>	NE	None Designated
<b>NMFS</b>		
<b>Middle Columbia River Steelhead</b>	NLAA	NLAA

\*NE=No Effect \*\*NLAA=May affect but Not Likely to Adversely Affect

**Yellow-billed cuckoo.** The yellow-billed cuckoo was federally listed by USFWS as threatened on October 3, 2014. Critical habitat was proposed for designation on August 15, 2014 but excluded Washington State. (USFWS 2015a).

Yellow-billed cuckoo require large, treed riparian corridors with dense, low scrubby vegetation. Nests are often placed in willows along streams and rivers, with nearby cottonwoods serving as foraging sites. (USFWS 2015a). Nesting pairs require large blocks of riparian habitat, which do not occur in the project area.

In winter, yellow-billed cuckoos can be found in tropical habitats with similar structure, such as scrub forest and mangroves. Individuals may be on breeding grounds between May and August. In the Pacific Northwest, the species was formerly fairly common in willow bottoms along Willamette and Columbia Rivers in Oregon, and in the Puget Sound lowlands and along the lower Columbia River in Washington. The species was also found in southeast British Columbia, but the available data are not adequate to determine historic abundance. The species was rare east of the Cascade Mountains in these States and provinces. There are no known occurrences near the project area. Transients have been documented in LaGrande, Washington and Moscow, Idaho. (Ebird 2015). The nearest known occurrences are nesting populations west of Boise, Idaho along the Boise River to the confluence of the Snake River (Corps 2015). There are also known populations along the Big Wood River in southeast Idaho. Yellow-billed cuckoo is believed to be extirpated from Washington. (USFWS 2015a; Van Stralen per comm. 2015). There are no known occurrences of yellow-billed cuckoo near the project area and the nearest known

breeding population is in southeast Idaho, therefore, it is determined the project would have no effect to yellow-billed cuckoo.

**Northern wormwood.** Northern wormwood became a candidate for federal listing in October 1999. It is a perennial plant in the aster family (Asteraceae). Also commonly known as Pacific sagebrush, it is generally a low-growing plant, 15 to 30 centimeters tall, but may grow up to 40 centimeters in height. This plant has a taproot and basal leaves crowded in rosettes. Northern wormwood is the only variety of *Artemisia* that flowers in April and May. (USFWS 2015c).

Historically, northern wormwood was collected along the banks of the Columbia River near the mouth of the John Day River in Wasco County, Oregon to the vicinity of Hood River in Hood River County, Oregon. These sites have been resurveyed for this species and no populations were found. It is likely that disturbances due to the construction of several dams and subsequent flooding of habitat resulted in the extirpation of historical occurrences. Currently, this plant is known to occur in only two sites along the Columbia River, in Klickitat and Grant Counties, Washington. These two populations were discovered in 1983.

The project area is predominantly disturbed and developed areas with little or no native upland habitats consisting of Siberian elm, silver maple, reed canarygrass, Kentucky bluegrass, and upland weeds. There is no suitable habitat for this species and no nearby occurrences of the plant. During the various site visits and plant surveys no northern wormwood plants were found; therefore, the project would have no effect on the northern wormwood.

**Gray wolf.** Gray wolves were first listed as endangered by USFWS on January 1, 1974. The Northern Rocky Mountains (NRM) population of gray wolf was identified as a Distinct Population Segment (DPS). In Washington, the NRM DPS includes that portion of Washington east of the centerline of Highway 97 and Highway 17 north of Mesa and that portion of Washington east of the centerline of Highway 395 south of Mesa (USFWS 2011). In Oregon and Washington, gray wolves that occur outside of the boundaries of this DPS remain federally listed as endangered. The project area is west of Highway 395 and is outside of the NRM DPS boundary and is therefore federally listed as Endangered (USFWS 2013).

Gray wolves were once common throughout much of Washington. Currently, wolf packs and individuals have been confirmed in the Selkirk Mountains of northeastern Washington and in the northern Cascade Mountains (WDFW 2009). Wolves have also been reported in the Blue Mountains of southeast Washington and northeast Oregon. There have been no packs south of Kennewick and reports of wolves in Yakima have not been verified (Van Stralen per. comm., 2015).



The project area is in a highly altered urban environment in the City of West Richland and wolves are not known to occur in the project area; therefore, the project would have no effect to gray wolves or their habitat.

**Bull trout.** Bull trout were originally listed by USFWS as threatened on July 10, 1998. Critical habitat for Bull trout was listed on September 30, 2010 and includes the lower Yakima River (USFWS 2010b). The Yakima Watershed Basin is listed as part of the Columbia River Distinct Population Segment (DPS) and was one of the 34 Core areas within the larger Middle Columbia Recovery Unit and all recovery units within the DPS.

The Yakima River bull trout exhibit four distinct life history patterns: anadromous, adfluvial, fluvial, and resident. Anadromous populations spend the early portion of their life in streams, grow to adulthood in the ocean, and eventually return to the tributaries in which they were born to spawn. Adfluvial populations spend between one and four years growing in their natal stream and then migrate to lakes to mature. Fluvial populations reside in larger streams and rivers then migrate after a few years to their natal stream to spawn. Resident bull trout spend their entire lives in or near the stream where they hatched.

Bull trout require cold temperatures, abundant cover in the form of large wood, undercut banks and boulders, clean substrate for spawning, interstitial space large enough to conceal juvenile bull trout, migratory corridors with minimal physical, biological or water quality impediments and stable channels (Shellburg 2002, USFWS 2005a).

While bull trout have access to, and have been historically documented in the lower Yakima River, fragmentation of habitat has resulted in a restricted distribution and their occurrence in the lower Yakima River is now rare even under good conditions. The lower Yakima River, within the southern end of the project area is a moderate to slow moving river with an unvegetated levee but dense cover along the side channel further north. This reach has predominantly silty loam substrates. Temperatures have been recorded to be up to 77°F during the summer low flow periods (August). (DOE 2015). This reach is also water quality limited and 303(d) listed for DDT and turbidity. The reach has low existing/potential large woody debris. These conditions provide a less than ideal habitat for aquatic resources.

Bull trout are most likely to occupy the lower Yakima River during winter months, and in very low numbers (Anglin et al. 2010; Van Stralen 2015 per. comm.). They spawn during September and October and should be out of the main channels and in the smaller, higher elevation tributaries such as the Naches by the end of October.

There is no in-water work but six non-native trees would be removed near the shoreline which would temporarily reduce shade and affect soil stabilization; however, the trees would be replaced with approximately 400 native trees and shrubs that would be planted along the trail and the shoreline. Work adjacent to the water is likely to occur during low flow periods between August and September when bull trout are not likely to be present; therefore, the project would have no effect to bull trout and their designated critical habitat.

There would also be landscaping and lawn all along the path and trail facilities. Runoff would be treated in stormwater treatment areas and runoff from the trail would be directed upland. In addition, a stormwater pollution prevention plan (SWPPP) would be developed prescribing best management practices that would minimize erosion and sedimentation. The BMPs may include silt fencing, fiber wattles, and erosion control seeding. There would be no high decibel construction activities such as pile driving and no in-water work. Bull trout are not expected to occur in the project area due to the poor habitat and poor water quality.

The project would have no effect to bull trout and its designated critical habitat due to the following:

- Adults and juveniles are not expected to be present in the project area during the in-water work window, which is during the low flow period.
- There is no spawning in the project area.
- Water temperatures in the project area during construction would be too high to support bull trout.
- There would be no in-water work.
- The six trees that would be removed are non-native and would be replaced with approximately 400 native trees and shrubs. Landscaping would also provide soil stabilization and may provide limited habitat.
- There would be no blasting, saw cutting, pile driving or other loud or vibratory impacts.
- A SWPPP and the implemented BMPs including silt fencing, fiber wattles and erosion control seeding would minimize potential impacts due to erosion and sedimentation.

**Middle Columbia River steelhead DPS.** The Middle Columbia River DPS of steelhead is federally listed as threatened. Critical habitat for the Middle Columbia River DPS of steelhead was designated in the project area. (NOAA 2015). All Yakima Basin Steelhead are classified as summer steelhead (YBFWRB 2008).

Steelhead prefer deep, cool waters high in dissolved oxygen (DO) with large substrate and riffle habitat. Early life stages are susceptible to low oxygen conditions, reductions in river flow, high water temperatures and loss of stream cover (Wydoski and Whitney 2003).

Steelhead within the project area are either rearing in the slower portions of the river or migrating through the area to spawning areas in smaller tributaries. Adult steelhead may be migrating upstream through the area to spawn in Corral Creek where gravel patches occur with suitable substrate size (YBFWRB 2008). They are not expected to be present in the project area in the warmest months during the in-water work window and when work closest to the river is expected to occur (Yeager, per. comm.). This reach and side channels are used for rearing by juveniles which are expected to be present year-round but are not expected to be abundant due to the high temperatures during August and September in this reach. They are more likely to be holding in the slower areas of the river such as the side channels and backwater areas further north.

The project may affect but is not likely to adversely affect Middle Columbia Steelhead and its designated critical habitat due to the following:

- There would be no in-water work that could cause water quality impacts.
- There is no spawning in the project area.
- Adults that are migrating through the area are not expected to be present during the in-water work window, which is during the low flow period.
- Juveniles may be present year-round in the project area but would not likely to be abundant due to the high temperatures expected during August and September in this reach.
- The six trees that would be removed are non-native; however, they provide shade, which contributes to lower water temperatures necessary for the species. The trees are also a future source of woody debris, which is needed for stream and habitat diversity and supports insects that are a food source for the fish. Insect larvae on leaves may fall into the water providing a food source for the fish species. The tree removal could also result in a temporal loss of refugia and organic material within the aquatic habitat.
- The removed trees would be replaced with approximately 400 native trees and shrubs that would be planted immediately adjacent to the shoreline and within the park including areas that are currently unvegetated. This would provide a future source of riparian habitat for shade, greater species diversity, soil stabilization, and large woody debris recruitment for future stream diversity and food sources.

- There would be no blasting, saw cutting, pile driving or other loud or vibratory impacts.
- A SWPPP and the implemented BMPs including silt fencing, fiber wattles and erosion control seeding would minimize potential impacts to water quality due to erosion and sedimentation.
- A stormwater pond would be located outside of the riparian area and would capture and treat stormwater along the road and parking lot, which would minimize water quantity and water quality impacts.

## **3.6 Vegetation**

### **3.6.1 Affected Environment**

The project area is located along the lower Yakima River shoreline, which consists of a forested riparian corridor of variable width and quality that is largely dominated by non-native species with a few native species interspersed. Vegetative data was collected during site visits in 2014 and 2015 during preparation of the Shorelines Permit, Habitat Management Plan, Biological Assessment and Wetland Delineation Report. See Table 4. Plants Observed in the Project Area.

The shoreline buffer south of the bridge is an unvegetated levee with a gravel surface. The shoreline north of the bridge becomes steep with a thin strip of trees and shrubs, primarily non-native species. Several areas along the shores of the Yakima River near Fox Island have aquatic plants including cattail, bulrushes and duckweed. The riparian corridor is dominated by silver maple, cottonwood and red osier dogwood with some black locust, Russian olive, arbor vitae and Siberian elm.

There are no native bunchgrass stands, shrub-steppe or other types of native vegetation near the project construction although, these vegetation types do occur north of the golf course outside of the project area. The forested riparian corridor increases in width further north near the side channel and Fox Island.

Table 4. Plants Observed in the Project Area

<b>Common Name</b>	<b>Scientific Name</b>
Silver maple	<i>Acer saccharinum</i> L
Crested wheatgrass	<i>Agropyron cristatum</i>
Creeping bentgrass	<i>Agrostis stolonifera</i>
Thin leaf alder	<i>Alnus incana</i>
Western serviceberry	<i>Amelanchier alnifolia</i>
Spreading dogbane	<i>Apocynum androsaemifolium</i>
Big sagebrush	<i>Artemisia tridentata</i>
Kochia	<i>Bassia scoparia</i>
Water birch	<i>Betula occidentalis</i>
Paper birch	<i>Betula papyrifera</i>
Cheatgrass	<i>Bromus tectorum</i>
Sedge species	<i>Carex</i> sp.
Canada thistle	<i>Cirsium arvense</i>
Western white clematis	<i>Clematis ligusticifolia</i>
Poison hemlock	<i>Conium maculatum</i>
Red-osier dogwood	<i>Cornus alba</i>
Black hawthorn	<i>Cratageous douglasii</i>
Barnyard grass	<i>Echinochloa crus-galli</i>
Russian olive	<i>Elaeagnus angustifolia</i>
Field horsetail	<i>Equisetum arvense</i>
Horseweed	<i>Erigeron canadensis</i>
Red fescue	<i>Festuca rubra</i>
Cow parsnip	<i>Heracleum maximum</i>
Common St. John's-wort	<i>Hypericum perforatum</i>
Prickly lettuce	<i>Lactuca serriola</i>
Duckweed	<i>Lema minor</i>
Perennial ryegrass	<i>Lolium perenne</i>
Reed canarygrass	<i>Phalaris arundinacea</i>
Common plantain	<i>Plantago major</i>
Kentucky bluegrass	<i>Poa pratensis</i>
Black cottonwood	<i>Populus balsamifera</i>
Lombardy poplar	<i>Populus nigra</i>
Bitter cherry	<i>Prunus emarginata</i>
Smooth sumac	<i>Rhus glabra</i>
Black locust	<i>Robinia pseudoacacia</i>
Nootka rose	<i>Rosa nutkana</i>
Blackberry	<i>Rubus armeniacus</i>
Curly dock	<i>Rumex crispus</i>

<b>Common Name</b>	<b>Scientific Name</b>
<b>Coyote willow</b>	<i>Salix exigua</i>
<b>Pacific willow</b>	<i>Salix lasiandra</i>
<b>Blue elderberry</b>	<i>Sambucus cerulea</i>
<b>Hard-stem bulrush</b>	<i>Schoenoplectus acutus</i>
<b>Bittersweet nightshade</b>	<i>Solanum dulcamara</i>
<b>European mountain-ash</b>	<i>Sorbus aucuparia</i>
<b>Spirea</b>	<i>Spirea douglasii</i>
<b>Common snowberry</b>	<i>Symphoricarpos albus</i>
<b>Dandelion</b>	<i>Taraxacum officinale</i>
<b>Cattail</b>	<i>Typha latifolia</i>
<b>Siberian elm</b>	<i>Ulmus pumila</i>
<b>Stinging nettle</b>	<i>Urtica dioica</i>
<b>Common mullein</b>	<i>Verbascum thapsus</i>

### **3.6.2 Environmental Consequences**

#### **3.6.2.1 No Action**

The No Action Alternative may involve occasional tree trimming, mowing and debris removal but no trees would likely be removed. The non-native plant communities would continue to dominate the site and would limit the regeneration of native species. The levee south of the Van Giesen Street Bridge would continue to be unvegetated. The 2,525 square feet of pavement that was removed previously, would establish to grass.

#### **3.6.2.2 Proposed Project**

Six non-native trees would be removed but would not result in significant negative effects to vegetation (Anderson, 2015a). None of the trees are located on the Corps-levee. Planting over 400 native trees and shrubs would add vegetative diversity and improve the habitat in the long-term. It would enhance the natural character of the shoreline, stabilize the soils, and improve shade, cover and connectivity. 1,500 square feet of the mitigation area adjacent to the river would be restored. 2,525 square feet of pavement, which was previously removed would develop to grass and landscaping. All planted areas identified would provide wildlife function and would appear natural in design.

## **3.7 Waters of the US and Wetlands**

### **3.7.1 Affected Environment**

#### **3.7.1.1 Rivers and Shoreline**

This segment of the lower Yakima River is navigable and regulated by the Corps under Section 10 of the Rivers and Harbors Act of 1899. Any activities in wetlands are also jurisdictional by the Corps under Section 404 of the Clean Water Act. The river supports salmonids including steelhead and bull trout, which are federally-listed species.

The City of West Richland encourages riparian buffers within 200 feet of the OHWM along this reach of the lower Yakima River. This section of shoreline currently has a variable width buffer with various non-native and native trees and areas of sparse woody vegetation. This segment of the Yakima River is 303(d) listed and water quality impaired for DDT, turbidity and temperature. The project area is located along the western shoreline of the lower Yakima River, a tributary to the Columbia River. The northern section of the project is adjacent to a backchannel of the lower Yakima River that flows around the west side of Fox Island.

#### **3.7.1.2 Wetlands**

The Yakima River Gateway Project Wetland Delineation Report was prepared for the Yakima Gateway Project in February 2015 (Anderson 2015c). The U.S. Army Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987) with the Regional Supplement to the U.S. Army Corps of Engineers Wetland Delineation Manual: Arid West Region (Corps 2008) methods were used, and the Washington State Wetland Rating System for Eastern Washington – Revised (Hruby 2008) was used to assess the project area’s wetland functions and values. Any activities in wetlands are jurisdictional by the Corps under Section 404 of the Clean Water Act. See Appendix C, Wetland Delineation Report.

Three wetlands were identified and delineated in the study area, and are evaluated in the Wetland Delineation Report but only one, Wetland A, is within the current project area and is described below.

**Wetland A.** Wetland A is a high functioning, riverine forested wetland located within the 100-year floodplain. It functions high for habitat, hydrologic functions and water quality. Local roads and residential developments on its southwest end border the wetland. The West Richland Golf Course is on its west side and the Yakima River and Fox Island is on its east side. Wetland A provides storage and

treatment for runoff from the golf course, residential areas, and roads before the runoff enters the Yakima River. It is also widely used by waterfowl, herons, beaver, and many other wildlife species. Wetland A has several depressions and secondary flood channels that hold floodwaters during high flows and attenuate it, which benefits downstream developments. The wetland connects and is contiguous to aquatic, emergent, scrub-shrub and forested habitat along the Yakima River and contains snags and woody debris that provide habitat.

### **3.7.2 Environmental Consequences**

#### **3.7.2.1 No Action**

The No Action Alternative would have no in-water construction and minimal effect to the lower Yakima River and its side channel. There may be continued degradation of the wetlands due to the close proximity of residences, roads and businesses. In addition, the shoreline and wetland would continue to be degraded by human activities due to the lack of designated shoreline access for watercraft and other water dependent recreational activities.



Figure 8. Wetland and Buffer Effects



### **3.7.2.2 Proposed Project**

The proposed project, including the levee modification would avoid wetlands and would not conduct activities waterward of the OHWM. There would however be project activities within the wetland buffer north of the bridge. There would be no wetland buffer effects due to the levee modification because the gravel levee is not in a wetland buffer and has no ecological function. See Figure 8. Wetland and Buffer Effects.

Approximately 0.3 acres of vegetated shoreline and wetland buffer would be converted to impervious or lawn conditions to create park landscapes and features. Much of the remainder of the wetland and shoreline buffer is already developed with residences, businesses, pavement, roads, gravel and lawns. The City would plant approximately 400 native trees and shrubs suited to the conditions of the site and suitable soils and available hydrology, which would mitigate any lost ecological function. See Appendix A, Design Plans. In addition, 1,500 square feet of the shoreline buffer would be restored as mitigation. The net benefit would be a shoreline buffer with a variable buffer of approximately 10 to 150 feet wide along the lower Yakima River.

The additional plantings would improve shoreline stability and create habitat and shade. The vegetation would also enhance connectivity and habitat functions along the shoreline and increase biodiversity. The area where 2,525 square feet of pavement was removed from Fallon Drive and Butte Court would be converted to grass and landscaping which would also improve habitat connectivity, increase pervious surface and offer water quality treatment in the immediate area.

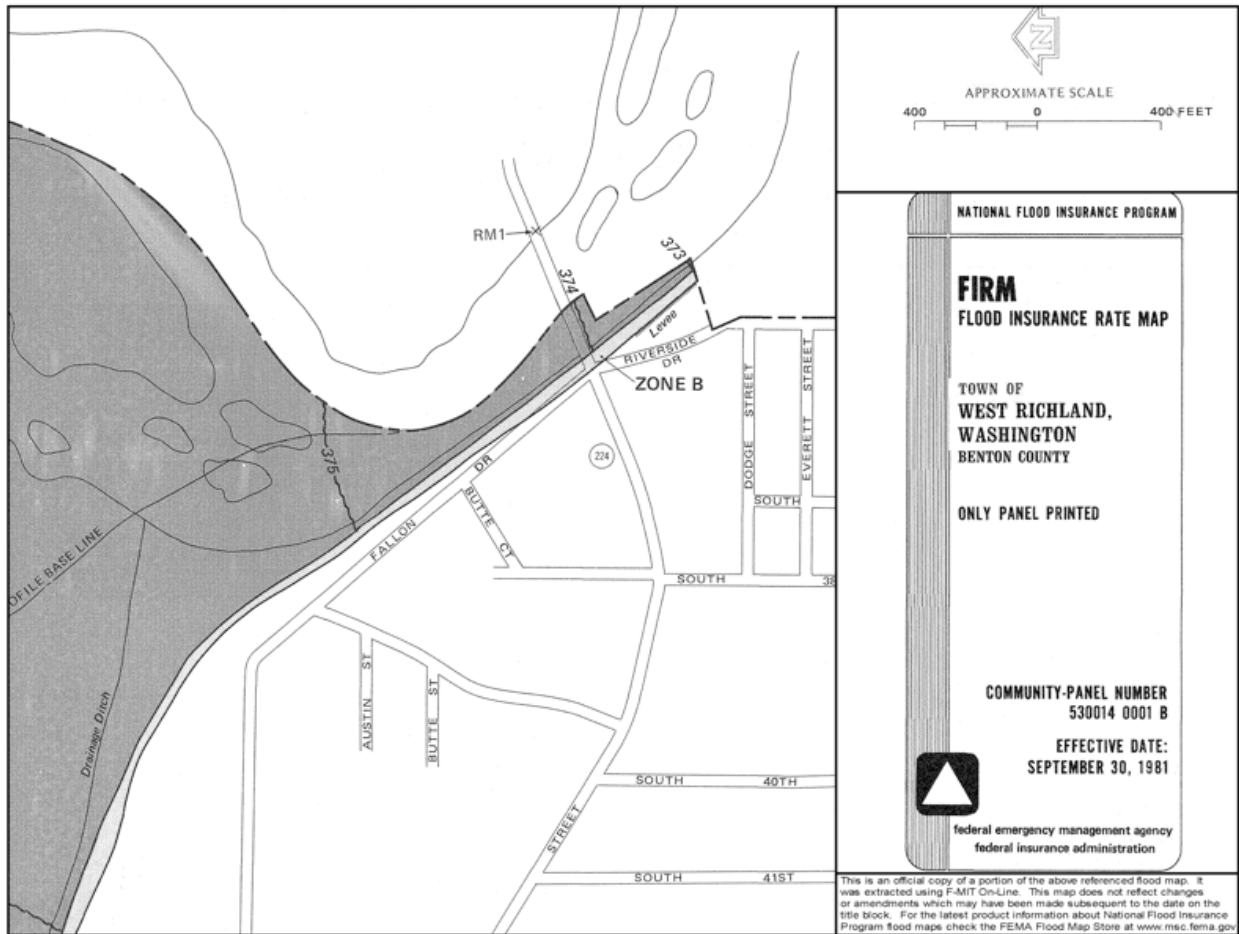
The mitigation area would be maintained and monitored for 5 years. Permanent monitoring locations would be established to represent different vegetative communities. If it is determined that less than 80 percent of the planted species are surviving, then the plants would be replaced. Implementation of the proposed project would not result in significant negative effects to wetlands or shoreline vegetation.

## **3.8 Floodplains**

### **3.8.1 Affected Environment**

Most of the project area is landward of the Corps-levee. Flood Emergency Management Agency, (FEMA) Firm Panel 5300140001B from the FEMA Map Service Center was reviewed. The existing levee functions to control floodwaters during high flows. See Figure 9. Floodplain Map. The project appears to encroach on Zone B, which is between the 100-year and 500-year floodplains. See also Figure 3. Site Elevations at Van Giesen Street Bridge

**Figure 9. Floodplain Map**



### 3.8.2 Environmental Consequences

#### 3.8.2.1 No Action

The No Action Alternative would not impact or modify the levee and there would be no encroachment on 100-year floodplains or floodways.

#### 3.8.2.2 Proposed Project

The Yakima River Gateway Trail would have no in-water work or work within the 100-year floodplain or floodways. Approximately 120 linear feet of the Corps-levee would be modified to construct a ramp and stairs and to construct the flood wall. This levee modification is necessary to connect the trailhead on the south side of the bridge to the trail north of the bridge. This work would improve the structural integrity of the levee in this area. There would be no fill in the 100-year floodplain or activities that could affect base flood elevations.

Work on the levee would require a Section 408 permission from the Corps, which requires the Corps to review construction plans for maintenance and structural integrity of the levee. Implementation of the proposed project would not result in significant negative effects to floodplains or protected areas maintained by the levees.

Vegetation removal along the shoreline would be minimized and would be only as stated on plans. Riprap would be replaced under the bridge above the OHWM to protect the path and to minimize scour and sedimentation during high flows.

### **3.9 Groundwater**

#### **3.9.1 Affected Environment**

The lower Yakima Valley has health concerns related to nitrate and bacterial contamination in the groundwater, which presents a health concern for drinking water (Ecology, 2010). This is believed to be due to the agricultural history of the area. There is no Sole Source Aquifer in the project area (EPA 2015).

#### **3.9.2 Environmental Consequences**

##### **3.9.2.1 No Action**

Under the No Action Alternative, no changes in the groundwater quality or quantity would be expected to occur. The project is a low impact development that would not create substantial pollutants. Runoff from the cul-de-sac would continue to drain to the stormwater area to be collected and treated prior to infiltration.

##### **3.9.2.2 Proposed Project**

Construction of the Proposed Project may create temporary construction stormwater impacts due to soil disturbance. A SWPPP would be implemented and BMPs would be utilized to minimize the risk of sediments and pollutants being transported in stormwater. BMPs could include silt fence, fiber wattles and erosion control seeding.

A fuel or oil spill could potentially occur but the risk is low. To minimize potential impacts due to a spill, a Spill Plan would be prepared and an emergency spill kit would be available on-site during construction. Fuel and other hazardous chemicals would not be stored on site during construction except as described in the SWPPP.

During construction of the project it is possible that groundwater may be encountered when the excavation for the southern access flood wall is performed. If that occurs a sump would be installed to pump water away from the structure. The pump would discharge to the stormwater treatment area and would infiltrate into the ground. No other construction is expected to encounter groundwater.

After construction, runoff from impervious surfaces would either be discharged to the stormwater treatment area on the south side of the bridge or runoff would infiltrate into the ground. The area where 2,525 square feet of pavement was removed from the vacated Butte Court, would be converted to grass and landscaped which would increase pervious surface and water quality treatment in the immediate area. There would be no well or other groundwater withdrawal designed for the project. Implementation of the proposed project would not result in significant negative effects to groundwater. See Appendix D, Geotechnical Report.

### **3.10 Cultural Resources**

#### **3.10.1 Affected Environment**

A cultural resource survey report titled *Cultural Resources Inventory for the Yakima River Gateway Project, Benton County, Washington* was completed in December 2014 (HRA 2014). Field investigations showed the project area to be disturbed from modern construction activities, including the construction of the roadways, housing developments, and dumping trash on the side of the roadway. A pedestrian survey and 20 shovel probe excavations were performed. No prehistoric or historic-era cultural materials were found and no further investigation was warranted. There were no archaeological or historical resources identified that were listed or eligible for the National Register of Historic Places (NRHP) or that appeared to be culturally significant.

The City has consulted with the Umatilla Tribe and the Department of Archaeology and Historic Preservation (DAHP) regarding the project on November 25, 2014 and January 30, 2015. See Appendix E, Cultural Resource Survey. No response was received from the Umatilla Tribe. The Corps will further coordinate with the tribes regarding any potential effect, during the public review.

### **3.10.2 Environmental Consequences**

#### **3.10.2.1 No Action/No Change**

There are no archaeological or historical resources listed or eligible for the NRHP and no locally important cultural resources within the Area of Potential Effect (APE); therefore the No Action Alternative would not affect cultural resources.

#### **3.10.2.2 Proposed Project**

There are no archaeological or historical resources listed or eligible for the NRHP in the APE ,which includes the Corps-levee, and no locally important cultural resources; therefore the Yakima River Gateway Trail would not affect cultural resources.

### **3.11 Recreation**

#### **3.11.1 Affected Environment**

The lower Yakima River and the West Richland Golf Course are the primary recreational opportunities near the project area. Warm temperatures and low rainfall during the summer attracts visitors to the area. Some recreational activities enjoyed in the project area include non-motorized boating (rafting, floating, kayaking, and canoeing), fishing and golfing. Currently there is no good access to the river or defined parking areas. Recreationalists must park on the residential roads and access the river through a section of Wetland A (Anderson 2015c).

#### **3.11.2 Environmental Consequences**

##### **3.11.2.1 No Action**

Recreation would continue as it currently exists with the No Action Alternative with no formal recreational access to the river. Lack of designated watercraft access in the wetland would continue to degrade the wetland vegetation and soils (Anderson 2015c).

##### **3.11.2.2 Proposed Project**

The proposed Project would construct a 10 to 12-foot multi-use path from just south of the Van Giesen Street Bridge (State Road 224) along the shoreline to the intersection of Fallon Drive. This would include a trailhead on the south side of the bridge with 52 parking spaces and a restroom. The new trail would cross underneath the existing bridge and continue to the north for approximately 1,050 linear feet linking to the area north of the bridge. This trail connection would provide access to a non-motorized

boat launch facility, day use park and interpretive overlook. The project would be ADA compliant and would have additional features including lighting, interpretive signage, resting areas, entry monument signage, and passive open areas. The Corps-levee would be incorporated into the proposed park and would be modified to allow for expanded recreational use of the area.

## **3.12 Noise**

### **3.12.1 Affected Environment**

Sources of noise in the proposed project area come mostly from traffic along Van Giesen Street Bridge (State Road 224), 38<sup>th</sup> Ave. and Fallon Drive. Occasional watercraft on the river also generates noise. Other noise sources include outdoor machinery and equipment used by local residents and businesses. Traffic and outdoor equipment noise is present but is normal for this urban setting.

### **3.12.2 Environmental Consequences**

#### **3.12.2.1 No Action**

The No Action Alternative would not affect local noise differently than today. The primary source of noise would continue to be vehicular traffic from the adjacent highway and local roads, noise from nearby businesses, and maintenance equipment such as lawn mowers and other landscaping equipment. There would continue to be noise from people accessing the river.

#### **3.12.2.2 Proposed Project**

The proposed Yakima River Gateway Project would cause noise levels to temporarily increase during construction. Surrounding neighbors, local businesses and the recreating public may be temporarily affected by equipment noise and/or trucks traveling to and from the project area. Demolition would require use of concrete saws and jackhammers, and loading materials into trucks. To minimize these effects equipment would be in good working condition and not be left idling. Work would occur during daylight working hours only.

When the Yakima River Gateway Project is constructed there would be more noise during daylight hours as people use the park facilities; however, there is privacy fencing along the residential areas and the parking would be in a designated area away from the residences, on the south side of the Van Giesen Bridge, which would reduce neighborhood disruption to the denser residential developments on the north side of the bridge. The West Richland Municipal Code's Noise Regulation (Chapter 9.38) would apply to those recreating in the park and park hours would be from dawn until dusk.

### 3.13 Climate Change

#### 3.13.1 Affected Environment

The proposed project area includes water, vegetation, fish and wildlife that could be affected by climate change. Rising air temperatures could correspond to a rise in stream temperatures, and affect habitats and water levels. This would likely further reduce the quality and suitability of steelhead and bull trout habitat in the lower Yakima River, which are federally listed species as noted in the *Yakima River Gateway Project Biological Assessment* (Anderson 2015b).

Within the Pacific Northwest, east of the Cascades, the climate has trending towards more sunshine and drier conditions, creating a sharp contrast to the maritime climate of the western Pacific Northwest. Average annual precipitation occur during the warm half to the year and is generally less than 20 inches, with some places receiving as little as seven inches. Annual and daily temperature ranges are considerably greater than west of the Cascades as well (Littell et al., 2009).

Changes in temperature and precipitation would continue to decrease snow pack, and would affect stream flow and water quality throughout the Pacific Northwest region. Warmer temperatures would result in more winter precipitation falling as rain rather than snow throughout much of the Pacific Northwest, particularly in mid elevation basins where average winter temperatures are near freezing. The change would result in:

1. Less winter snow accumulation
2. Higher winter streamflows
3. Earlier spring snowmelt
4. Earlier peak spring streamflow and lower summer streamflows in rivers that depend on snowmelt (most rivers in the Pacific Northwest).

The decline of the regions snowpack is predicted to be greatest at low to middle elevations due to increases in air temperature and less precipitation falling as snow. The average decline in snowpack in the Cascade Mountain was about 25% of the last 40 to 70 years with most of the decline due to the 2.5 degrees F increase in cool season air temperatures over that period. As a result, seasonal stream flow timing would likely shift significantly in sensitive watersheds. (Littell et-al., 2009).



### **3.13.2 Environmental Consequences**

#### **3.13.2.1 No Action**

There would be no effects to climate change as a result of the No Action Alternative. Gradual climate change would continue, in correlation with increasing CO<sub>2</sub> emissions worldwide.

Climate change would have a minimal effect to the levee project as the levee is designed to attenuate flood risk.

#### **3.13.2.2 Proposed Project**

Climate change is predominantly caused by emissions from burning fossil fuels. Since this proposed project enhances pedestrian and non-motorized recreational opportunities there is no increase the use of fossil fuel usage or vehicular use. Diesel fuel and gasoline consumption by heavy machinery, trucks and paving activities required for construction would be minor and temporary. The CO<sub>2</sub> emissions resulting from constructing the proposed project are considered to be insignificant. The levee modification would have no effect on climate change.

Climate change would have a minimal effect to the levees as the West Richland levee is designed to attenuate flood risk. The proposed levee modification would have to meet the Corps design standards required for flood attenuation.

### **3.14 Socioeconomics**

#### **3.14.1 Affected Environment**

The proposed project includes two blockgroups according to the US Census Data from 2010. See Table 5. Household Income for the five-year population estimates and economic indicators for the block groups compared to the City of West Richland.

**Table 5. Household Income**

<b>Economic Data</b>	<b>City of West Richland Census Data for City</b>	<b>North of Van Giesen Street Bridge Census Blockgroup 530050107031 (% of Total)</b>	<b>South of Van Giesen Street Bridge Census Blockgroup 530050107084 (% of Total)</b>
<b>Median Household Income</b>	\$82,848	-	-
<b>Individuals Below Poverty Level</b>	6.5%	-	-
<b>Household Income &lt;\$15,000</b>	-	29%	3%
<b>Household Income \$15,000-\$25,000</b>	-	2%	9%
<b>Household Income \$25,000-\$50,000</b>	-	24%	31%
<b>Household Income \$50,000-\$75,000</b>	-	15%	24%
<b>Household Income \$75,000+</b>	-	30%	33%

### **3.14.2 Environmental Consequences**

#### **3.14.2.1 No Action**

The No Action Alternative would have negligible or no adverse socioeconomic effects in West Richland or the surrounding area. The existing properties would be maintained similarly to today’s conditions. The land would remain vacant and there would be no improvements behind the trailer homes. No jobs would be created by the action or the gateway concept, and businesses would not benefit from construction.

The recreational visitors to the area would continue to disrupt local residents and businesses due to the lack of parking and occasional trespassing. In addition, handicapped users would still not be able to access the park and river due to the lack of ADA accessible features.

#### **3.14.2.2 Proposed Project**

The proposed Project would have long-term positive socioeconomic benefits to West Richland because it would create an attractive park with parking, restrooms, ADA access, an overlook and interpretive signage that would be likely to increase recreational use of the area. The new park would be an aesthetic improvement and could attract people to the area. It could improve the value of the adjacent properties and contribute to the neighborhood’s quality of life. Providing a ramp, stairs and floodwall and connecting the trailhead to the trail would benefit all users.

Gateway signage would provide a formal entrance into the City of West Richland and could benefit the business community. There would be temporary impacts to the surrounding businesses during construction due to noise, dust, material storage, and operation of construction equipment. There would also be a temporary economic benefit to businesses during construction with the presence of workers and construction related employment and procurement.

### **3.15 Environmental Justice**

#### **3.15.1 Affected Environment**

As outlined in Executive Order 12898, federal agencies must evaluate the potential for the Proposed Project and its alternatives to result in disproportionately high and adverse effects to low-income and minority populations. Race, ethnicity, poverty status and income data were obtained for the City and specific blockgroups to determine if there is a high concentration of low-income or minority populations that could be affected by the project.

Based on the ACS 5-Year estimate obtained from EJ View, approximately 18 percent of the population north of the Van Giesen Street Bridge is minorities and approximately four percent of the populations south of the bridge are minorities. The City of West Richland has approximately eight percent minorities. This indicates that there is a higher percentage of minorities north of the bridge compared to the City of Richland as a whole. See Table 6. Race and Ethnicity. The demographic information also shows a higher Hispanic rate north of the bridge compared to south of the bridge or the City of West Richland as a whole.

**Table 6. Race and Ethnicity**

<b>Demographic Description</b>	<b>City of West Richland Census Data for City</b>	<b>North of Van Giesen Street Bridge Census Blockgroup 530050107031</b>	<b>South of Van Giesen Street Bridge Census Blockgroup 530050107084</b>
	2009-2013 ACS 5-Year Estimate	2008-2012 ACS 5-Year Estimate	2008-2012 ACS 5-Year Estimate
<b>Population Data by Race</b>			
<b>Total Population (inclusive of Hispanic)</b>	12,301	1074	481
<b>White alone</b>	92%	82%	96%
<b>Black/African American alone</b>	0%	0%	0%
<b>American Indian/Alaska Native alone</b>	1%	11%	0%
<b>Asian alone</b>	1%	4%	0%
<b>Pacific Islander alone</b>	0%	0%	0%
<b>Other Race alone</b>	4%	0%	2%
<b>Two or More Races</b>	2%	3%	2%
<b>TOTAL</b>			
<b>Hispanic Population (% of Total Population)</b>	11%	3%	27%
<b>Minority Population (% of Total Population)</b>	8%	18%	4%

The City of West Richland has a median household income of \$82,848. Census blockgroup data for the neighborhood north of the Van Giesen Street Bridge shows that 31 percent of households earn less than half of the city’s median household income. Census blockgroup data for the neighborhood south of the Van Giesen Street Bridge shows that 12 percent of households earn less than half of the city’s median household income (EPA 2015b). See Table 5. Household Income. This would indicate there are lower income households north of the Van Giesen Street Bridge compared to the City and the area south of the bridge. There is also a trailer park north of the bridge, which can be an indicator of low cost rent and low-income populations.

### **3.15.2 Environmental Consequences**

#### **3.15.2.1 No Action**

The No Action alternative would not affect the surrounding communities differently. The shoreline and City-owned property would continue to be vacant but with occasional access, littering and nuisance

behaviors. It would not have facilities that could accommodate all users, would not be ADA accessible and would not improve the park system for the community.

### **3.15.2.2 Proposed Project**

The blockgroup north of the bridge has a greater percentage of lower income households compared to the City as a whole and compared to the areas south of the bridge (EPA 2015b). A trailer park, which can be an indicator of low-cost housing and can be associated with low-income populations, is also located in the area north of the bridge (EPA 2015b).

The proposed project would not have a disproportionate or adverse effect on low-income or minority populations. The majority of the low income and minority populations are located north of the Van Giesen Street Bridge and the project would benefit those properties and would not be adverse because it would provide recreational opportunities and access to the shoreline for those users. It would also relieve some of the traffic and parking issues with the neighborhood north of the bridge by providing a designated parking lot south of the bridge.

## **4 CUMULATIVE IMPACTS**

The National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) implementing regulations require federal agencies to consider the cumulative effects of their actions. Cumulative effects are defined as effects “on the environment which result from incremental impact of an action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time” (40 CFR § 1508.7).

The primary goal of a cumulative effects analysis is to determine the magnitude and significance of the environmental consequences of the proposed project in the context of the cumulative effects of other past, present, and reasonably foreseeable future actions.

### **4.1 Resources Considered**

While the EA addresses the effects of alternatives on the range of resources representative of the human and natural environment, not all of those resources need to be included in the cumulative effects analysis – just those that are relevant to the decision to be made on the proposed project. The

following resources have been identified as notable for their importance to the area and potential for cumulative effects. Those resources are:

- Aesthetics
- Shoreline Habitat
- Threatened and Endangered Species
- Recreation

Resources are discussed in terms of their cumulative effect boundary (spatial and temporal), the historic condition and impacts to the resources, present condition and impacts to the resources, reasonably foreseeable future actions that may affect the resources, and the effects to the resource by the various alternatives when added to other past, present, and future actions.

This section evaluates the cumulative effects of actions that could potentially affect the same environmental resources as those discussed earlier in this EA. The scope of this analysis extends beyond the Yakima River Gateway Project to other areas that sustain the resources of concern. A resource may be differentially impacted in both time and space. The implication of those impacts depends on the characteristics of the resource, the magnitude and scale of the project's impacts, and the environmental setting (EPA 1999).

## **4.2 Geographic and Temporal Scope of Cumulative Effects Analysis**

Guidance for setting appropriate boundaries for a cumulative effect analysis is available from CEQ (1997) and EPA (1999). Generally, the scope of cumulative effects analysis should be broader than the scope of analysis used in assessing direct or indirect effects. "Geographic boundaries and time periods used in cumulative impact analysis should be based on all resources of concern and all of the actions that may contribute, along with the action effects, to cumulative impacts" (EPA 1999). The analysis should delineate appropriate geographic areas including natural ecological boundaries, whenever possible, and should evaluate the time period of the action's effects.

Discussed below are the past, present, and reasonably foreseeable future actions that were considered for the cumulative effects analysis, the effects of the actions on the resources assessed, and a summary of the cumulative effects of the alternatives. Table 7 summarizes the geographic and temporal boundaries used in this cumulative effects analysis.

**Table 7. Geographic and Temporal Boundaries of Cumulative Impacts**

<b>Resources</b>	<b>Geographic Boundary</b>	<b>Temporal Boundary</b>
<b>Aesthetics</b>	Lower Yakima River	Approximately 50 years
<b>Riparian Habitat</b>		
<b>Threatened and Endangered Fish</b>		
<b>Recreation</b>		

The geographic boundary for the cumulative impacts analysis for aesthetics, shoreline habitat, threatened and endangered fish, and recreation considers actions taking place in this portion of the Yakima River Watershed. The timeframe of approximately 50 years was identified based on approximate construction start of the West Richland levees in 1963. A timeframe of five years into the future has been considered. Only actions that are reasonably foreseeable a strong indication that an action/event would occur or be conducted are included.

#### **4.3 Past, Present and Reasonably Foreseeable Future Actions and Implications for Resources**

The following sections present summaries of past, present, and reasonably foreseeable future actions considered in this cumulative effects analysis, and the effects of those actions on the resources considered.

##### **4.3.1 Past Actions and Historical Background**

Before 1850 European presence in the Yakima Basin was largely limited to the early surveyors who describe banks of the lower Yakima River as having extensive willows and scattered cottonwoods, with larger groves of riparian trees on limited areas of bottomland. The influx of large wood from upstream caused wood accumulations that scoured pools and encouraged island formation. Periodic large floods would have moved the river’s cobble bedload on regular basis, likely creating excellent spawning habitats for fall Chinook (Apel 2011).

During the 1850s, missions were established, the Yakama Wars took place and the first cattle drives into the Yakima Valley occurred. The first white settlers were cattlemen who came to the Yakima Valley around 1860. The Northern Pacific Railway was constructed in the valley in 1886. Between 1860 and 1890 irrigation development significantly affected tributaries of the Yakima River and contributed to the agricultural development of the landscape. Extensive grazing and wood gathering for firewood, fences,

lumber and hop kilns presumably lead to heavy impacts on riparian vegetation and wood floated down from the mountains by the river. (Apel 2011).

The Benton Irrigation District received water from the Sunnyside system in 1912 and the Kiona District in 1917 to irrigate the bottomlands. The upstream diversions greatly reduced flows to the lower Yakima River during the summer baseflow periods. After 1920, the construction of dams, and regulation of flows affected flows and water temperatures. Between the 1920s and 1980 the ongoing decline of the remaining runs of anadromous fish resulted due to degradation of habitat. Coho were extirpated and steelhead and spring Chinook dropped to their lowest levels by the early 1980s. (Apel 2011).

During the 1950s, the area grew rapidly adding community centers, churches, major roadways, bridges, and the golf course. The construction of a fire department and introduction of street lighting and sewer expanded resulted in the residential expansion.

In the 1980s legal action by the Yakama Nation led to changes in management of the water allocation for agriculture and fisheries. Significant investments in habitat improvements higher in the Yakima Basin, changes in management of the Columbia River, restrictions on fisheries, new hatchery programs for Coho and Chinook in the Yakima River, and improved ocean conditions, resulted in significantly improved anadromous fish runs from their lows in the late 1970s and early 1980s. By 2009, conditions in the Yakima River had improved enough for the Yakama Nation and partners to begin reintroducing sockeye and summer Chinook to the Yakima Basin. The success of these reintroduction efforts would be highly dependent on the ability of adult salmon to pass through the lower Yakima River from June through September. Where steelhead, Coho and spring Chinook runs improved significantly, fall Chinook, which is the run most dependent on conditions in the lower Yakima River, have not done as well. Together, these trends have increased the level of attention being paid to habitat conditions in the lower Yakima River.

In 1949 two separate but adjacent cities, Herminger City and Enterprise combined to form the City of West Richland in 1953. The city had only 600 residents when it was formally incorporated in 1955 and that number almost doubled by 1959.

In 1963, the Corps completed the West Richland levee system, an approximately 5,885-foot levee embankment along the right bank of the lower Yakima River constructed to protect residential and other properties west of the Yakima River. The population of the City continued to grow (U.S. Army Corps of Engineers 2011).



In 2013, the City of West Richland proposed creation of a city park, to be constructed within the footprint of the old Fallon Drive/Butte Court rights-of-way as part of a redevelopment strategy within portions of Van Giesen Road.

#### **4.3.1.1 Effects of Past Actions on Resources**

**Aesthetics.** The Yakima River and its tributaries have been heavily altered for the purpose of irrigated agriculture. There are numerous dams and irrigation canals. Irrigation runoff is in places returned to the river through canal drains. The irrigation system in the Yakima River's watershed causes periods of both severe river dewatering and elevated flows, relative to historic stream flow regime. As a result, discharge statistics for the Yakima River are heavily affected by the irrigation system.

Urban development along the Tri-Cities area has altered the natural shoreline habitat. Areas that would have supported steppe-sagebrush habitat have been converted to forested riparian areas or grassy fields. Invasive species have established along areas of the shoreline, trees were planted, and other areas were removed of trees.

The area surrounding Van Giesen Street Bridge has been developed since pioneer days. The edges along the shoreline were developed for the establishment of what would become West Richland. The area abuts residential development and road corridors.

**Shoreline Habitat.** The Yakima River riparian habitat has been altered for the purpose of irrigated agriculture and urban development. Areas that would have supported steppe-sagebrush habitat have been converted into forested riparian areas or grassy fields. Invasive species have established along the areas of the shoreline. Trees have been planted, and other forested areas were converted into residential and commercial developments.

The area surrounding the Van Giesen Street Bridge has a variable width of riparian buffer shoreline. Some areas along the shoreline developed into forested areas because of the non-maintained shoreline. The shoreline buffer is currently approximately 10 to 150 feet in width.

Riparian buffers assist in improving water quality. The lower Yakima River is designated imperiled because of land application of herbicides (DDT), sediment runoff (turbidity) and temperature (removal of shoreline vegetation).

**Threatened and Endangered Species.** The Yakima River is one of the largest tributaries to the Columbia River in both area and flow. It is estimated to have produced anywhere from 400,000 to 2 million adult salmon each year prior to the 19<sup>th</sup> century collapse of salmon populations. Past actions including

diverting stream flows, agricultural pollutants and constructing levees that cut off the functional floodplain continue to contribute to the decline of the species. The Yakima River watershed continues to support critical habitat for steelhead and bull trout. Many anthropomorphic activities were directly or indirectly the cause of these species decline.

Some of the most significant limiting factors compromising salmonid habitat in the lower Yakima River watershed include:

- Inadequate or no screening for many water diversions.
- Artificial fluctuation or dewatering of stream channels
- Reduction in habitat heterogeneity and floodplain connectivity
- Alteration of natural hydrologic regime
- Impairment of water quality
- Negative interactions between fish species

The area surrounding the Van Giesen Street Bridge has been developed since pioneer days. The edges along the shoreline were developed for the establishment of what would become West Richland. The critical habitat value of the project area is moderate to high because of the adjacent intact wetlands and woody vegetation. The project area abuts residential development and road corridors with little to no stormwater management.

**Recreation.** Major landowners along the Yakima River shoreline include federal and state agencies and the Yakama Indian Nation. Private ownership accounts for 1,246,818 acres. The United States Forest Service manages 892,509 acres, and the Yakama Nation owns 889,786 acres within the Yakima River Basin. Forested areas in the northern and western portions of the basin occupy approximately 2,200 square miles and are used for recreation, wildlife habitat, timber harvest, grazing, and tribal cultural activities. Rangelands comprise about 2,900 square miles and are used for military training, grazing, wildlife habitat and tribal cultural activities.

The confluence of the Yakima River and the Columbia River has historically been a popular area for water recreational activities. West Richland citizens enjoy rafting and boating along the Yakima River. Historically (and currently), public access to the Yakima River has been restricted to public lands and public open space which included recreational use.

### 4.3.2 Present Actions

The West Richland levee system is operated and maintained by Benton County Diking District No. 1. In 2011 the Corps rated the levee system minimally acceptable and therefore it remains eligible to apply for federal rehabilitation assistance if it is damaged in a flood or storm event. Present actions include operation and routine maintenance of the West Richland flood control project. The Corps performs annual inspections of the levee systems and the City of West Richland maintains them. Other projects in the Lower Yakima include construction of the Duportail Bridge, a four-lane bridge over the Yakima River that would improve connectivity for bike, pedestrian and vehicular traffic between the central core of Richland and south Richland. This project has undergone environmental review but has not yet been permitted. Immediately west of the proposed action was the location of the City of West Richland water and sewer line project which removed the roadway, installed water and sewer lines, fencing and resulted in abandoning the old roadway. This was constructed in 2015.

#### 4.3.2.1 Effects of Present Actions on Resources

**Aesthetics.** City residents and the Tri-cities value the Yakima River shoreline for its natural setting nestled in an urban environment.

The City plans to maintain approximately 33 percent of its land for parks and recreational opportunities, most of which would be located within the eastern portion of the City. The majority of the eastern portion of the City is urban and commercial development. This area around the Van Giesen Street Bridge has been designated for re-development to revitalize the residential community (single-family), commercial businesses (medium density commercial) as well as promote open space.

**Shoreline Habitat.** Shoreline habitat along the Yakima River is currently dominated by non-native deciduous trees and shrubs with river willow stands within urban areas and sparse woody vegetation within rural to agricultural areas. Significant overhanging vegetation is naturally limited along reaches in the lower Yakima River Watershed. The shoreline is dominated by shrub-steppe and bunchgrass understory with forbs, and cryptogram crust (YSFWPB 2004). The dominant vegetation in areas that are unaltered by agriculture or development, likely resembles historical conditions that existed prior to settlement in the semi-arid lowland valleys and canyons of the Yakima River basin.

Forested shorelines provide shade, stream stability and food sources to support different life stages of wildlife and aquatic species, particularly salmonids. The riparian habitat is affected by agricultural

practices, urban developments, road construction, culverts, loss of vegetation, and stream bank alterations.

There have been minimal modifications to the Yakima River shoreline habitat within agricultural and rural areas of the stream are minimal. Within the uplands, impervious surfaces are associated with the irrigation pumping stations and a road and infrastructure. These streambanks are anticipated to remain almost void of forested vegetation.

Within urban shorelines of the Yakima River, forested vegetation is encouraged. Maintaining a 200 foot forested buffer enhances water quality. The urban environment is dominated by impervious surfaces consisting of roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, and packed earth (e.g. lawns, athletic fields, etc.), or other surfaces which similarly impede the natural infiltration of surface and storm water runoff. A forested riparian buffer would assist in improving water quality of stormwater runoff by infiltrating and treating stormwater prior to discharge into the Yakima River.

Based on current and future expectation, this segment of the Yakima River shoreline habitat is unlikely to significantly change in from current conditions. The designation of the shoreline jurisdiction reflects the City's intent to continue to encourage riparian buffers in areas where the shoreline is designated environmentally valuable and in urban environments. This segment of the Yakima River would continue to consist of a moderate to low riparian habitat quality due to its natural steppe, arid environment and natural low forested/tree density. Trees would continue to be planted within the urban environment for aesthetics, environmental and water quality reasons in areas where they are appropriate.

**Threatened and Endangered Species.** The lower Yakima River is presumed to have had unimpeded physical passage for adult and juvenile fish through rapids in the river at Horn Rapids/Wanawish and Prosser funneled fish past native fisheries. Water quality was presumed to have being good although the temperatures but the baseflow conditions were unknown. A study by Stanford et al. (2001) indicates that under higher flows there is greater amount of floodplain connectivity, interstitial flow, deeper water, and ore riffles bellow Prosser dam. Flow withdrawals reduce the amount of water available for aquatic resources, including ESA-listed steelhead and bull trout, downstream of the point of diversion.

According to the WDFW, anadromous fish habitat is present in the Yakima River along the City of West Richland. In addition, the Yakima River known as a spawning area for Coho Salmon and Chum Salmon and as rearing habitat for Steelhead, Chinook, and Pink Salmon and Bull Trout. The Endangered Species

Act (ESA) lists Steelhead, and Bull Trout as threatened species with designated critical habitats in this river reach.

Important habitat elements for fish include riparian cover, passage for migration, clean water, spawning habitat, off-channel habitat, forage habitat, and food sources. There are several areas of spawning habitat in the City shoreline areas, and rearing habitat has been identified in the Yakima River within the City. Alteration of these habitats, loss of wetlands and riparian areas reduce the habitat areas for many species including small mammals, amphibians, reptiles, birds, and other aquatic and terrestrial species.

Along the eastern segment of the City, has a relatively high potential to provide functions primarily related to habitat conditions that include meandering pool-riffle channel, likely spawning areas, and stable vegetated bars that support potential food production and interactions. Functions present include the development of complex in-stream habitat structure and groundwater exchange with the floodplain. Functions may be impacted by current land use, agriculture practices, and existing commercial and residential development. This reach may also provide important functions related to water and sediment transport processes.

Based on current and future expectation, this segment of the Yakima River protected species habitat is unlikely to significantly change in quality or designation from current conditions. The Yakima River Gateway Project improves existing shoreline conditions by establishing riparian buffers needed to improve fish habitat. The Yakima River would continue to support designated critical habitat and support protected species spawning and rearing habitat.

**Recreation.** The Yakima River is used for rafting and kayaking, especially around Ellensburg area and near the confluence with the Columbia River during the summer months. The Yakima River is ranked between Class I and Class II rapids, depending on the circumstances and season. In the Tri-Cities, the delta where the Yakima River meets the Columbia River has several hiking trails. The City of West Richland has no existing designated public access to the Yakima River. The public within the Tri-Cities area desires outdoor and park activities including waterborne recreational activities such as kayaking and canoeing. Access to the Yakima River would increase public opportunities for water recreation as well as environmental stewardship to protect the river. Providing access to the Yakima River would provide a net benefit to the citizens and encourage environmental awareness.

The WDFW manages 22 water access sites along the Yakima River; however, the closest access site is in Benton County, over 5 river miles away from the project area. That site, Hyde Road access, is not ADA compliant. The closest ADA compliant site is over 15 river miles away from the project area.

### 4.3.3 Effects of Reasonably Foreseeable Future Actions on Resources

**Aesthetics.** Based on current and future expectation, this segment of the Yakima River shoreline viewshed is unlikely to significantly change in use and intensity from current conditions. The designation of the shoreline jurisdiction reflects the City's intent to continue to redevelop within urban areas. The Yakima River would continue to have a high aesthetic quality due to its remoteness, surrounding natural landscapes and agricultural setting within an urban environment.

Future effects to aesthetics within the lower Yakima River watershed are very difficult to predict. Many people would accept that development is going to continue to occur in and around the City of West Richland and might be neutral on the aesthetic quality of the area. Installation of additional trail, park facilities and watercraft access and construction of an Americans with Disabilities Act (ADA) trail would likely be seen as improving the aesthetic quality of the immediate area. However, this is not likely to offset the quality lost by removing the trees along the river. More trees would be added the park in the upland areas.

**Shoreline Habitat.** The City has issued no shoreline development permits in the western portion of West Richland and only two shoreline development permits in the eastern portion of West Richland over the past 20 years. Considering the lack of significant shoreline developments, the effects of the current project and the implementation of the new Shoreline Master Plan (SMP), which regulates development in the shoreline jurisdiction for the lower Yakima River, the project is not expected to result in cumulative effects to the aesthetics of the area.

The strong economy of the area and the continuous development pressures have caused residential and business development in the lower Yakima River Watershed but due to existing shoreline regulations, wetland and wetland buffer setbacks this has not significantly diminished the riparian habitat.

Continued human development within the watershed may have some negative effects on the amount of vegetation, but planting of new trees offsets some of these impacts. The District often uses volunteers to plant trees on federally-managed land.

The high amount of human development and lack of quality wildlife habitat along the lower Yakima River through the city West Richland continues to negatively affect riparian habitat. However, at the watershed scale, the lower Yakima River corridor provides high value habitat for many wildlife species. Present actions maintain the poor quality of terrestrial wildlife habitat in the lower watershed and the high quality of the habitat in the upper watershed.

The future actions discussed in this analysis would have little if any measureable effect on terrestrial resources within the lower Yakima River Watershed.

**Threatened and Endangered Species.** Through the implementation of the stormwater laws and regulations the Yakima River it would be expected that water quality would be maintained to its current level or continue to improve within the watershed. Local special interest groups, government agencies, tribes, and businesses have several collaborative restoration efforts to enhance salmon and bull trout habitat along the Yakima River. Overall, these protected species are well supported and it would be expected that conditions continue to improve for these species through improving water quality, riparian buffers, and creating green space.

The Yakima River Gateway Park would provide a forested riparian buffer along the Yakima River, a component of both bull trout and steelhead critical habitat needed for cooling the water and providing insects for foraging. The proposed modification to the levee would not significantly affect the designated critical habitat for these two protected species. Therefore, it would be anticipated that these fish would continue to utilize this section of the river in the foreseeable future.

**Recreation.** Within the eastern portion of West Richland, 50.3% of the area is allowed for parks and recreational facilities and public capital facilities. The shoreline in this portion of the City is not anticipated that to significantly change from current conditions.

Approximately 33.4% of the upland shoreline area is zoned on the western portion of West Richland as in the Public Parks and Recreation zoning district where public recreational facilities are permitted. Given the existing operational agricultural land use, it is not expected that the existing land use would change from the current condition.

There are no other planned recreation projects within the City of West Richland that are funded at this time. However, in the future the City of West Richland would like to seek funding for extension of the trail north and east of the golf course. This combined with the proposed project would be a net benefit to recreation in the lower Yakima River Watershed.

#### **4.3.4 Summary of Cumulative Effects of Past, Present, and Reasonably Foreseeable Future Actions on Resources**

The proposed Project would have some minor temporary, negative effects from construction activities, as previously described.

In the immediate area where the trees are removed the aesthetic value would be reduced but would improve over time with the development of the landscaping and the increased use of the trails for recreation.

There would be minor negative effects to wildlife such as birds, small mammals and deer by implementation of the proposed project when combined with cumulative effects from other actions. The proposed project would cause a localized temporary decrease in riparian habitat, but it is not expected to have any detrimental measurable impact on bird or other wildlife populations within the watershed. It would be increased as the plantings mature.

Steelhead and bull trout have been and continue to be negatively affected within the watershed. The levee modification would not directly impact these fish so the project would not add to the cumulative effects on this resource.

## **5 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS**

Summaries of compliance and coordination activities for each of the laws, policies, or regulation are also provided in this section.

### **5.1 National Environmental Policy Act (NEPA)**

As required by the National Environmental Policy Act (NEPA) and subsequent implementing regulations promulgated by the Council on Environmental Quality, this EA was prepared in order to determine whether the proposed action constitutes a "...major Federal action significantly affecting the quality of the human environment..." and whether an EIS is required. This EA documents the evaluation and consideration of potential environmental effects associated with the proposed action.

The EA will be circulated to other state and federal agencies and the public for review. The EA identified no impacts significantly affecting the quality of the human environment prior to distribution of the EA. If no such impacts are identified during the public review process, compliance with NEPA would be achieved upon the signing of a Finding of no Significant Impact (FONSI). However, if such impacts are identified during the public review, an EIS would be required. Completion of an EIS and the signing of a Record of Decision would then complete the NEPA process.



## **5.2 Endangered Species Act (ESA)**

The Endangered Species Act (ESA) established a national program for the conservation of threatened and endangered fish, wildlife and plants and the habitat upon which they depend. Section 7(a)(2) of the ESA requires consultation with the USFWS and NMFS, as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their critical habitats. Section 7(c) of the ESA and the Federal regulations on endangered species coordination (50 CFR §402.12) require that Federal agencies prepare biological assessments of the potential effects of major actions on listed species and critical habitat.

The Corps initiated informal consultation with NMFS and USFWS on December 17, 2015 by submission of a document titled *Yakima River Gateway Biological Assessment (BA)* which concluded the proposed project “may affect but is not likely to adversely affect” mid-Columbia River steelhead and “no effect” to the Columbia basin bull trout and their designated critical habitat. The proposed project was determined to have no effect to the other species that were evaluated.

The official US Fish and Wildlife Service (USFWS) species (Consultation Code 01EWF00-2016-SLI-0055) and the National Marine Fisheries Service (NMFS) (NOAA 2015) lists for listed and proposed threatened and endangered species, candidate species and proposed and designated critical habitat that may occur near the project area and/or may be affected by the proposed project were reviewed on October 20, 2015. The NMFS concurred with the findings that the project is not likely to adversely affect the steelhead trout (Appendix B). Therefore, there would be no effects to threatened or endangered species listed under the Endangered Species Act (ESA).

## **5.3 Essential Fish Habitat**

The consultation requirement of section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) directs Federal agencies to consult with NMFS on all actions, or proposed actions that may adversely affect Essential Fish Habitat (EFH). Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

The Pacific Fishery Management Council (PFMC) designated EFH for Chinook salmon, Coho salmon, and Puget Sound pink salmon (PFMC 1999). This Hydrologic Unit Code (HUC) has been identified as currently accessible EFH for Chinook and Coho salmon habitat. However, they are hatchery species. The discussion of steelhead trout above is applicable to the analysis of habitat, effects for the Chinook and Coho salmon that occur in this area. Because there would be no in-water work, no loud vibratory impacts to the water, and adults are not expected to be present during construction and because any trees removed would be replaced with native species, **there would be no effects to Chinook or Coho as described in the analysis of fish habitat, the proposed project is not likely to adversely affect EFH.**

#### **5.4 Fish and Wildlife Coordination Act of 1958, as Amended**

The Fish and Wildlife Coordination Act (FWCA) authorizes the USFWS to evaluate the impacts to fish and wildlife species from proposed Federal water resource development projects that could result in the control or modification of a natural stream or body of water that might have effects on the fish and wildlife resources that depend on that body of water or its associated habitats. **This proposed project does not involve activities subject to the FWCA.**

#### **5.5 Migratory Bird Treaty Act of 1918, as Amended**

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. §§ 703-712, as amended) prohibits the taking of and commerce in migratory birds (live or dead), any parts of migratory birds, their feathers, or nests. Take is defined in the MBTA to include by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing or transporting any migratory bird, nest, egg, or part thereof.

A wide variety of species listed under the MBTA occur on Crops managed lands. Ducks, geese, and mourning doves can be expected to nest in the project area and use the area as a wintering and resting area during migration. A variety of non-game birds also inhabit the area. The project area is dominated by gravels, riprap, cultivated lawn, and non-native and native trees and shrubs and may attract a limited number of migratory nesting birds. The tree removal would occur during the non-nesting periods between August 2 and March 14. If tree or vegetation removal or potential nesting habitat is determined to be necessary outside of that time period, (March 15 to August 1) a qualified migratory avian biologist would perform a breeding bird survey of the site. Any active nests would be avoided (50 foot diameter buffer) until no longer active. Because the trees would be replaced, and because the trees would be removed during non-nesting **periods or active nests avoided, the proposed project would not result in taking migratory birds, their nests, eggs, or parts thereof.**

## 5.6 Bald and Golden Eagle Protection Act (BGEPA)

The Bald and Golden Eagle Protection Act (BGEPA) prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions, primarily for Native American Tribes. Take under the BGEPA includes both direct taking of individuals and take due to disturbance. Disturbance is further defined on 50 CFR 22.3.

Throughout most of the western United States golden eagles are mostly year-long residents (Polite and Pratt 1999), breeding from late January through August with peak activity in March through July (Polite and Pratt 1999). They may also move down-slope for winter or upslope after the breeding season (Polite and Pratt 1999; Technology Associates 2009).

There are no known eagle nests or territories in this section of the lower Yakima River. (Ritter 2015). Golden eagles prefer cliff faces and bald eagles prefer large trees along riparian areas. While there are large trees within the project area and there is suitable habitat for bald eagles near the project area, and the area could be used for wintering, the closest known nest, confirmed by WDFW, is approximately 4.4 miles southeast near the confluence of the lower Yakima River and the Columbia River (Ritter 2015).

**The project is expected to have no impact to bald or golden eagles because there are no known nests or territories in this area and the work.**

## 5.7 National Historic Preservation Act (NHPA)

The National Historic Preservation Act (NHPA) of 1966 as amended directs federal agencies to assume responsibility for all cultural resources under their jurisdiction. Section 106 of NHPA requires agencies to consider the potential effect of their actions on properties that are listed, or are eligible for listing, on the National Register of Historic Places. The NHPA implementing regulations, 36 Code of Federal Regulations (CFR) Part 800, requires that the federal agency consult with the State Historic Preservation Office (SHPO), Tribes and interested parties to ensure that pall historic properties are adequately identified, evaluated and considered in planning for proposed undertakings.

In accordance with Section 106 of the NHPA [36 CFR Part 800], the Washington Department of Archaeological and Historic Preservation (DAHP) and the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) were contacted regarding effects to cultural resources. Letters with the proposed project information and a map of the area of potential effect were mailed on November 25, 2014 and January 30, 2015. A Cultural Resource Survey Report was prepared and it was determined there were no National Register Eligible or listed resources were identified in the APE and there would be *no effect* to

historic properties. The DAHP concurred with the finding of no effect on February 2, 2015. The Corps will renotify DAHP and the Tribe during the public review period.

## **5.8 Native American Graves Protection and Repatriation Act**

The Native American Graves Protection and Repatriation Act addresses the discovery, identification, treatment, and repatriation of Native American and Native Hawaiian human remains and cultural items (i.e., associated funerary objects, unassociated funerary objects, sacred objects, and objects of cultural patrimony).

Although not expected, in the event of an inadvertent discovery during construction, work would immediately halt, and the appropriate parties would be contacted.

## **5.9 Clean Water Act**

The Federal Water Pollution Control Act (33 U.S.C. §1251 et seq., as amended) is more commonly referred to as the Clean Water Act. This act is the primary legislative vehicle for Federal water pollution control programs and the basic structure for regulating discharges of pollutants into waters of the United States. The act was established to restore and maintain the chemical, physical, and biological integrity of the Nation's waters and sets goals to eliminate discharges of pollutants into navigable water, protect fish and wildlife, and prohibit the discharge of toxic pollutants in quantities that could adversely affect the environment. The act has been amended numerous times and given a number of titles and codifications.

Section 402 of the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) program, pertains to discharge of pollutants. No pollutants are expected to be discharged into waters of the U.S. by activities proposed in this EA. As per the SWPPP, BMPs would be installed prior to construction beginning.

Section 402 of the Clean Water Act also regulates ground disturbance that could potentially cause stormwater run-off into waters of the U.S. A Notice of Intent for a Construction General Permit would be filed with Ecology prior to construction and a SWPPP would be prepared and implemented.

Discharge of fill material below the ordinary high water line in waterways and within wetlands requires evaluation under Section 404 of the Clean Water Act. The City has performed a wetland delineation

report that was reviewed by the Corps and the project would not fill waters or wetlands. Therefore, the project does not require a Section 404 permit.

### **5.10 Watershed Protection and Floodplain Management Act**

The purpose of the Watershed Protection and Flood Prevention Act is to protect watersheds from erosion, floodwater, and sediment damages. The Act provides assistance programs to local organizations for the protection of watersheds, including flood control. The proposed project is in compliance with the Act. The proposed project would not affect 100-year floodplains.

### **5.11 Executive Order 11988, Floodplain Management**

Executive Order 11988 outlines the responsibilities of federal agencies in the role of floodplain management. Each agency must evaluate the potential effects of actions on floodplains and avoid undertaking actions that directly or indirectly induce development in the floodplain or adversely affect natural floodplain values. Alternatives considered for this project would not further alter the floodplain.

### **5.12 Executive Order 11990, Protection of Wetlands**

Executive Order 11990 directs federal agencies to provide leadership in minimizing the destruction, loss, or degradation of wetlands. No wetlands would be negatively impacted by the proposed project.

### **5.13 State of Washington/City of West Richland Regulations**

Washington State Environmental Policy Act (SEPA)-Pursuant to SEPA provisions (WAC Chapter 197-11-508), a SEPA document has been reviewed by the Washington Department of Ecology for the Yakima River Gateway Project (201504536 and SH 2015-41). It was approved by the State as of September 2, 2015.

Washington Shoreline Management Act/West Richland Shoreline Master Plan-Shoreline Substantial Development Permit # (SH-2015-41) was submitted to the Department of Ecology on September 28, 2015. This permit authorizes construction of the proposed Yakima River Gateway Park based on compliance with the Washington Shoreline Management Act (Chapter 90.58 RWC) and City of West Richland's Shoreline Master Plan.

## 6 Public and Agency Involvement

Table 8. Agency Consultations lists agency consultations during the design and permitting processes for the Yakima River Gateway Project:

**Table 8. Agency Consultations**

<b>Agency</b>	<b>Date</b>
<b>USFWS</b>	October 28, 2015
<b>NOAA</b>	October 29, 2015
<b>DAHP</b>	November 2014 and January 30, 2015
<b>Umatilla Tribe</b>	November 2014 and January 30, 2015
<b>Ecology</b>	January 21, 2015
<b>U.S. Army Corps of Engineers</b>	January 21, 2015 and December 2015
<b>Washington Department of Fish and Wildlife</b>	January 21, 2015 and January 2016
<b>City of West Richland Planning</b>	January 21, 2015

### 6.1 Hearings

The City held a Public Hearing for SH2015-41 (Shoreline Conditional Use Permit) was held before the Planning Commission October 22, 2015. It was properly noticed on the City's website as well as signs posted at the project site, and all landowners within 600' of the property site were notified via letter. The City Council held a closed record hearing on November 17, 2015 for a final decision.

### 6.2 Community/Landowner Meetings

All of the residents along Butte Court were contacted directly by the City. Residents were all agreeable to converting Butte Court to a park/trail in exchange for an alley for their property access. The Dickert residence located on the south side of Van Giesen adjacent to the dike, were contacted by the City and many meetings occurred. They are in support of the project, and would have a privacy fence installed in conjunction with the project.

### **6.3 Property Owner Letters**

The City sent a letter to all property owners within 600 feet of the project site received a combined notice of application for SH2015-41 (Shoreline Conditional Use Permit) and SEPA determination of non-significance. A full 30-day comment period was issued.

### **6.4 Public Notices and Website Postings**

The City presented a Preliminary Design was presented to the Parks and Recreation Board at the December 29, 2014 meeting. After Parks and Recreation Board was agreeable to the design, it was presented to City Council at a workshop on January 20, 2015. This project has been a standing item on the agenda at every Parks and Recreation Board meeting since December 2014. Agendas are posted prior to every meeting when cultural resources were discussed.

### **6.5 Public and Agency Coordination**

An agency coordination meeting occurred January 21, 2015 at City Hall. Representatives from Washington Department of Fish and Wildlife, Corps, WA Department of Ecology, and the City were present. A follow up meeting occurred May 6, 2015 with Corps, Washington Recreation and Conservation Office (RCO), Confederated Tribes of the Umatilla Indian Reservation (CTUIR), and City representatives. The main focus of this meeting was cultural resources.

The preliminary plan for the proposed project was presented to the Parks and Recreation Board during a meeting on December 29, 2014. The Parks and Recreation Board forwarded the agreed design to the West Richland City Council during a workshop on January 20, 2015. The proposed project has continued to be to discuss at City Council meetings and information has been posted to their website prior to each meeting, and at three official sites in West Richland to promote public awareness.

Also, the owners of the private residence, located on the south side of Van Giesen adjacent to the dike, were contacted by the City and many meetings occurred regarding establishing an easement through the property. The owners are in support of the proposed project, and would have a privacy fence installed in conjunction with the project.

This EA was made available to potentially interested members of the public and local, state, and federal agencies for a 30-day review period. The Corps will consider any comments received before moving forward in the NEPA process with a Finding of No Significant Impact (FONSI) if applicable, or on to the preparation of an Environmental Impact Statement if deemed necessary.

## 7 ENVIRONMENTAL COMMITMENTS

Table 9. Mitigation Measures lists mitigation measures that would be implemented as part of the proposed project.

**Table 9. Mitigation Measures**

<b>Mitigation Measure</b>	<b>Quantity/Area (square feet)</b>	<b>Ecological/Habitat Species Affected</b>
<b>Convert 2,525 square feet of pavement removed during a previous project, to grass and plantings.</b>	2,525	Improve habitat connectivity, urban habitat; increase pervious surface and water quality treatment in the immediate area.
<b>Create mitigation areas. Buffers would be restored with native vegetation.</b>	1,500	Improve shoreline stability, habitat, shade, and large woody debris recruitment next to shoreline. Enhance connectivity and habitat functions along shoreline. Increase biodiversity.
<b>Remove non-native vegetation.</b>	6 trees	Avoid disturbing birds during nesting periods. Removal of other non-native vegetation near the shoreline may occur over a 3-5 year period to allow native plants to regenerate and to minimize effects of vegetation removal.
<b>Stormwater treatment areas would be placed outside of the wetland/shoreline buffer south of the bridge.</b>	N/A	Consistent with WRMC. Avoid impacts to buffers. Improve water quality and fish habitat by treating stormwater.
<b>Stormwater Pollution Prevention Plan (SWPPP) would be prepared and BMPs (i.e. silt fence, fiber wattles, reseeded, soil stabilization) would be implemented</b>	N/A	Minimize temporary construction impacts, erosion and sedimentation.
<b>Work near the water would be during the in-water work window to protect fish and aquatic species (August 1 to September 30)</b>	N/A	Minimize potential impacts from erosion and sedimentation; minimize impacts to fish and aquatic species. There would be no work within flowing water.

## 8 REFERENCES

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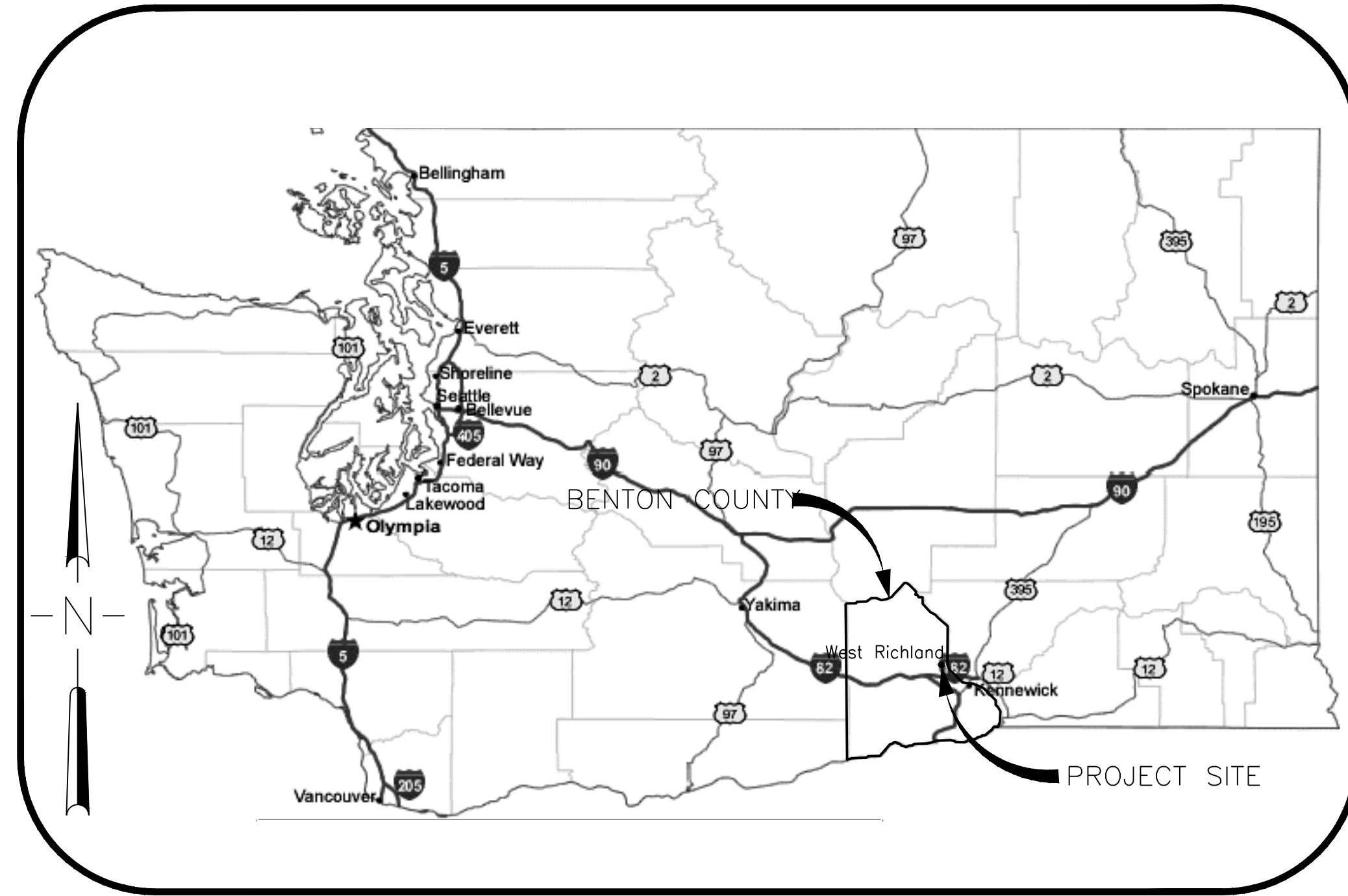
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- US Fish and Wildlife Service (USFWS 2015a) US Department of Interior; Official Species List; Yakima River Gateway Project; Benton County Washington, 01EWF00-2016-SLI-0055; Event Code 01EWF00-2016-E-00052; October 20, 2015
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Yeager, Personal communication with Justin Yeager, Biologist, on October 29, 2015 regarding the project, listed species and critical habitat that could occur in the project area, migration and rearing timing and habitat, and potential impacts.

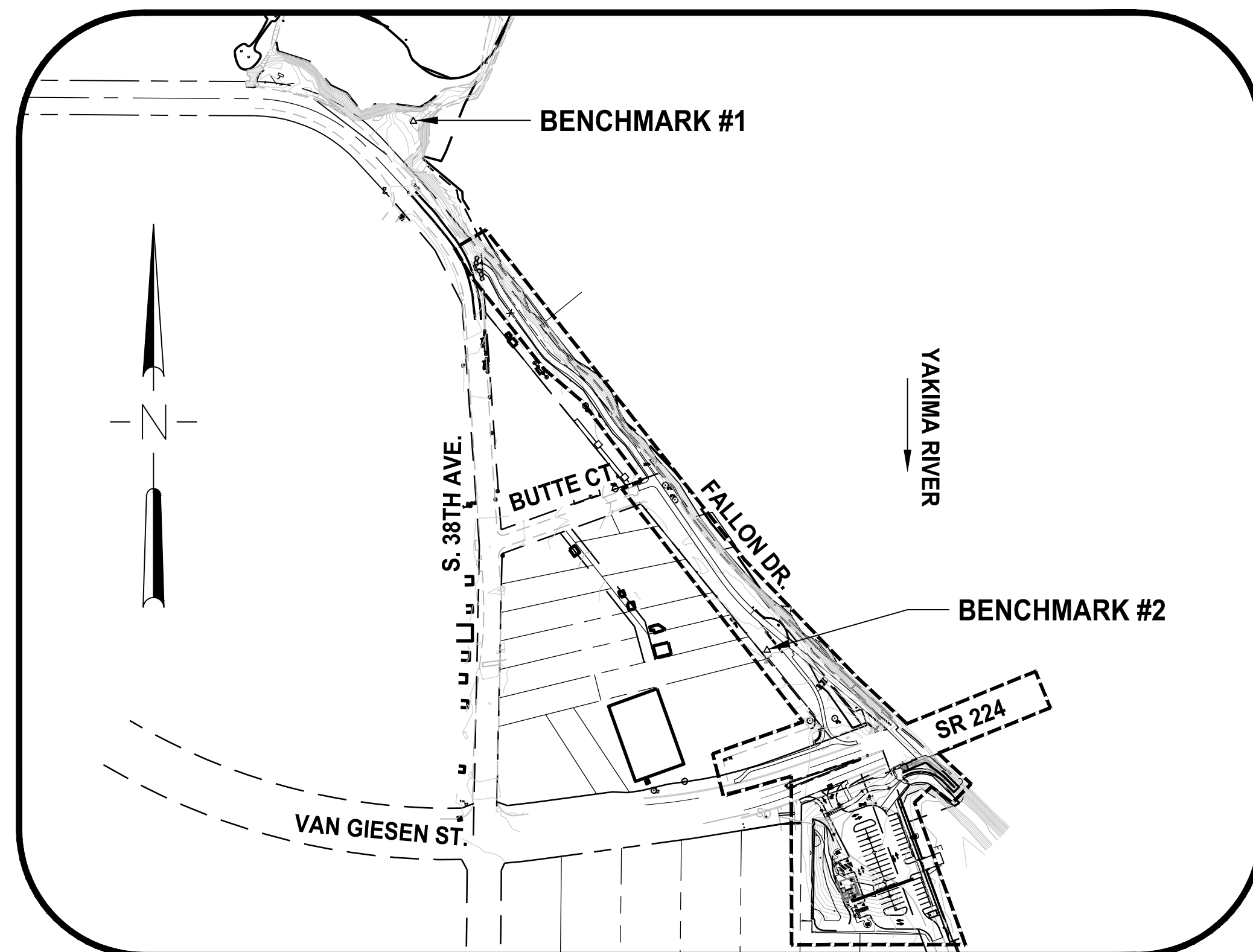
**APPENDIX A: DESIGN PLANS**

# YAKIMA RIVER GATEWAY

## WEST RICHLAND, WASHINGTON



VICINITY MAP  
NO SCALE



SITE MAP  
NO SCALE

### OWNER

**CITY OF WEST RICHLAND**  
 ROSCOE SLADE III  
 PUBLIC WORKS DIRECTOR  
 3801 W. VAN GIESEN ST.  
 WEST RICHLAND, WA 99353

### UTILITIES

UTILITY	OWNER	AUTHORITY	REVIEWED
POWER	BENTON REA	EASEMENTS PLATTED, R/W, FRANCHISE	_____ DATE
CABLE	CHARTER	EASEMENTS PLATTED, R/W, FRANCHISE	_____ DATE
TELEPHONE	FRONTIER	EASEMENTS PLATTED, R/W, FRANCHISE	_____ DATE
NATURAL GAS	CASCADE NATURAL GAS	EASEMENTS PLATTED, R/W, FRANCHISE	_____ DATE

### SHEET INDEX

- GENERAL**
  - G0.0 COVER SHEET
  - G0.1 LEGEND & ABBREVIATIONS
  - G1.0 DETAILS & SECTIONS
  - G1.1 DETAILS & SECTIONS
  - G1.2 DETAILS & SECTIONS
  - G1.3 DETAILS & SECTIONS
  - G1.4 DETAILS & SECTIONS
  - G1.5 OVERLOOK SECTIONS
  - G1.6 GUARDRAIL SECTIONS
- EROSION CONTROL**
  - C1.1 EROSION CONTROL & DEMOLITION PLAN
  - C1.2 EROSION CONTROL & DEMOLITION PLAN
  - C1.3 EROSION CONTROL & DEMOLITION PLAN
  - C1.4 EROSION CONTROL & DEMOLITION PLAN
  - C1.5 EROSION CONTROL & DEMOLITION DETAILS
  - C2.0 UTILITY PLAN
- PARK AND TRAIL**
  - T1.1 TRAIL LAYOUT AND MATERIALS PLAN
  - T1.2 TRAIL LAYOUT AND MATERIALS PLAN
  - T1.3 TRAIL LAYOUT AND MATERIALS PLAN
  - T1.4 TRAILHEAD LAYOUT AND MATERIALS PLAN
  - T1.5 SR 244 RIGHT-OF-WAY IMPROVEMENTS
  - T2.1 GRADING & LAYOUT ENLARGEMENTS
  - T2.2 GRADING & LAYOUT ENLARGEMENTS
  - T2.3 GRADING & LAYOUT ENLARGEMENTS
  - T2.4 GRADING & LAYOUT ENLARGEMENTS
  - T2.5 GRADING & LAYOUT ENLARGEMENTS
  - T3.2 NORTH BRIDGE WALL FOOTING & DRAIN ENLARGEMENT
  - T3.3 FLOOD WALL PLAN FOOTING & DRAIN ENLARGEMENT
  - T3.4 FLOOD WALL SECTIONS
- LANDSCAPE**
  - L1.1 PLANTING PLAN
  - L1.2 PLANTING PLAN
  - L1.3 PLANTING PLAN
  - L1.4 PLANTING PLAN
  - L2.1 IRRIGATION PLAN
  - L2.2 IRRIGATION PLAN
  - L2.3 IRRIGATION PLAN
  - L2.4 IRRIGATION PLAN
  - L3.1 PLANTING DETAILS
  - L3.2 IRRIGATION SCHEDULE & DETAILS
  - L3.3 IRRIGATION DETAILS
- INTERPRETIVE ELEMENTS**
  - F01 PLAN & ELEVATION @ EX1 & EX2
  - F02 PLAN, ELEVATION, & SIDE @ EX3
  - F03 PLAN & ELEVATION @ EX4
- ARCHITECTURAL**
  - A1.0 FLOOR PLAN AND EXTERIOR ELEVATIONS
  - A2.0 SIGNAGE PLAN & ELEVATIONS
- STRUCTURAL**
  - S1.0 GENERAL NOTES
  - S2.0 FOUNDATION AND ROOF FRAMING PLAN
  - S3.0 FOUNDATION DETAILS
  - S3.1 FOUNDATION DETAILS
- PLUMBING**
  - P1.0 PLANS
  - P2.0 PLUMBING SPECIFICATIONS
- ELECTRICAL**
  - E0.1 SYMBOLS, ABBREVIATIONS AND SCHEDULES
  - E1.1 ELECTRICAL SITE PLAN
  - E1.2 WSDOT BRIDGE PLAN-ELECTRICAL

### PROJECT DESIGNER

**MacKay Sposito**

7601 W. CLEARWATER AVE., SUITE 405  
 KENNEWICK, WA 99336  
 PHONE (509) 374-4248  
 www.mackaysposito.com  
 CONTACT: BRYAN COLE  
 509-619-7092

### ARCHITECT

MMEC ARCHITECTURE & INTERIORS  
 7601 W. CLEARWATER AVENUE, SUITE 206  
 KENNEWICK, WA 99336  
 CONTACT: JOSEPH HAMPTON  
 509-396-7278

### STRUCTURAL ENGINEER

GOKEY ENGINEERING  
 312 WEST 1ST AVENUE  
 SPOKANE, WA 99201  
 CONTACT: JACOB GOKEY  
 509-570-3313

### INTERPRETIVE SIGN DESIGNER

FORMATIONS  
 621 SE 202ND AVENUE  
 PORTLAND, OR 97233

### ELECTRICAL ENGINEER

DEI ELECTRICAL CONSULTANTS, INC.  
 2205 N. WOODRUFF RD, SUITE 5  
 SPOKANE VALLEY, WA 99206  
 CONTACT: ERIC SHIRLEY  
 509-747-5139

Approved For Construction:

CITY OF WEST RICHLAND  
 PUBLIC WORKS DIRECTOR \_\_\_\_\_ DATE \_\_\_\_\_

### VERTICAL DATUM

STATE PLANE ZONE: WASHINGTON SOUTH  
 (4602) - NAD83 (2011)  
 ELEVATIONS DERIVED FROM LOCALLY  
 ESTABLISHED CONTROL POINT USING NGS  
 OPUS STATIC SOLUTION - NAVD88 GEOID12A

### BENCHMARKS

**BENCHMARK #1**  
 POINT #1 IN DRAWING  
 NORTHING: 354798.1880  
 EASTING: 1934248.9370  
 ELEVATION: 379.66'

**BENCHMARK #2**  
 WR-1 IN DRAWING  
 NORTHING: 353871.07  
 EASTING: 1934827.62  
 ELEVATION: 420.



PRELIMINARY  
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YAKIMA RIVER GATEWAY  
 WEST RICHLAND, WASHINGTON

COVER SHEET

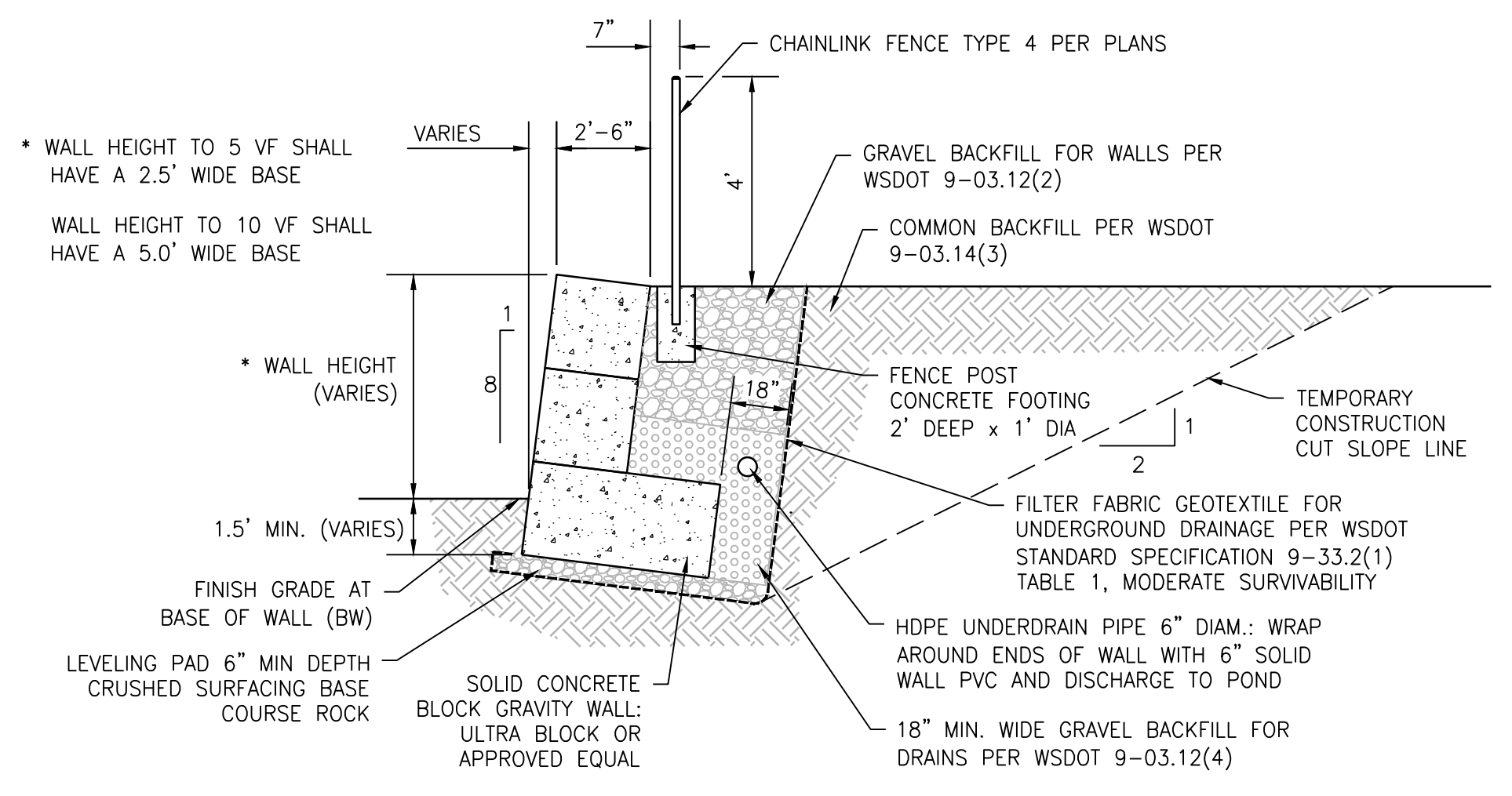
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 DATE: 12/23/2015  
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 CHECKED BY:

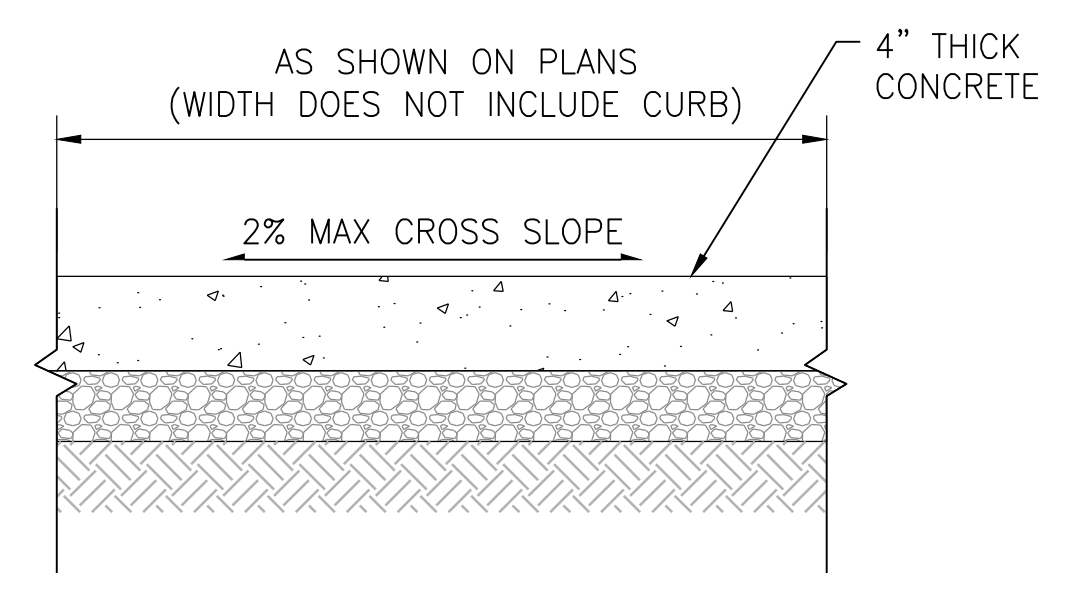
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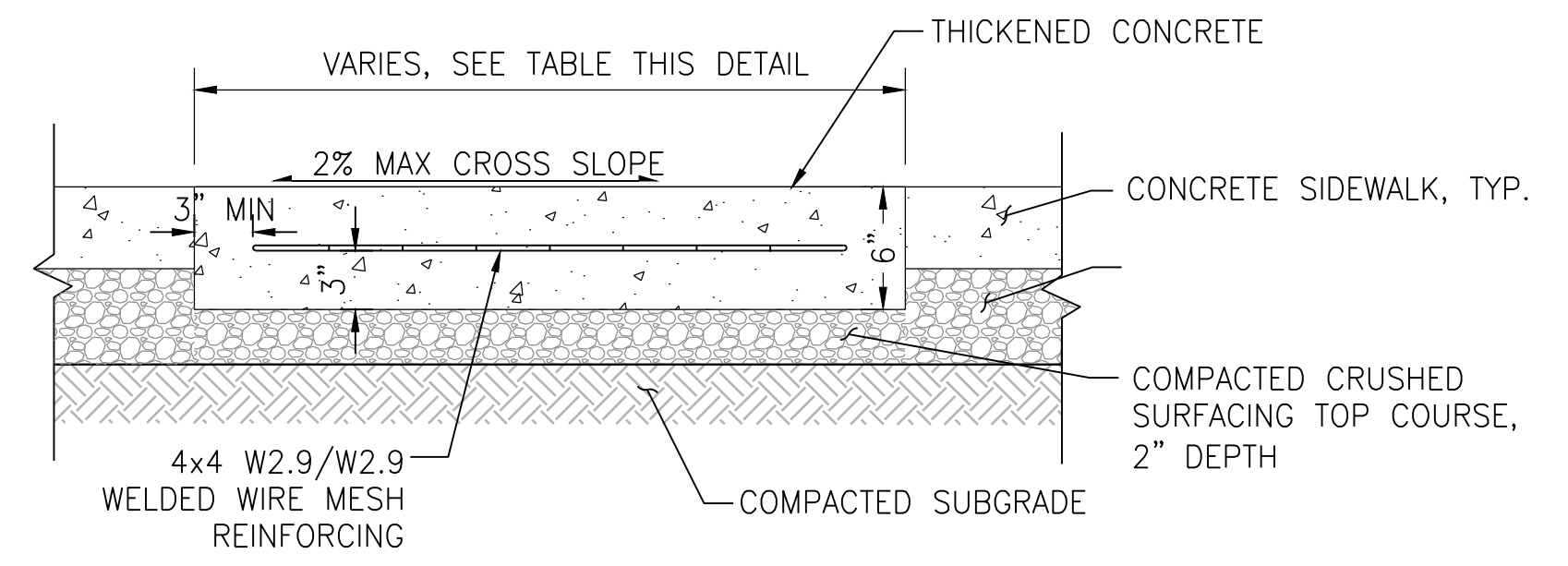
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1 GRAVITY BLOCK RETAINING WALL NOT TO SCALE

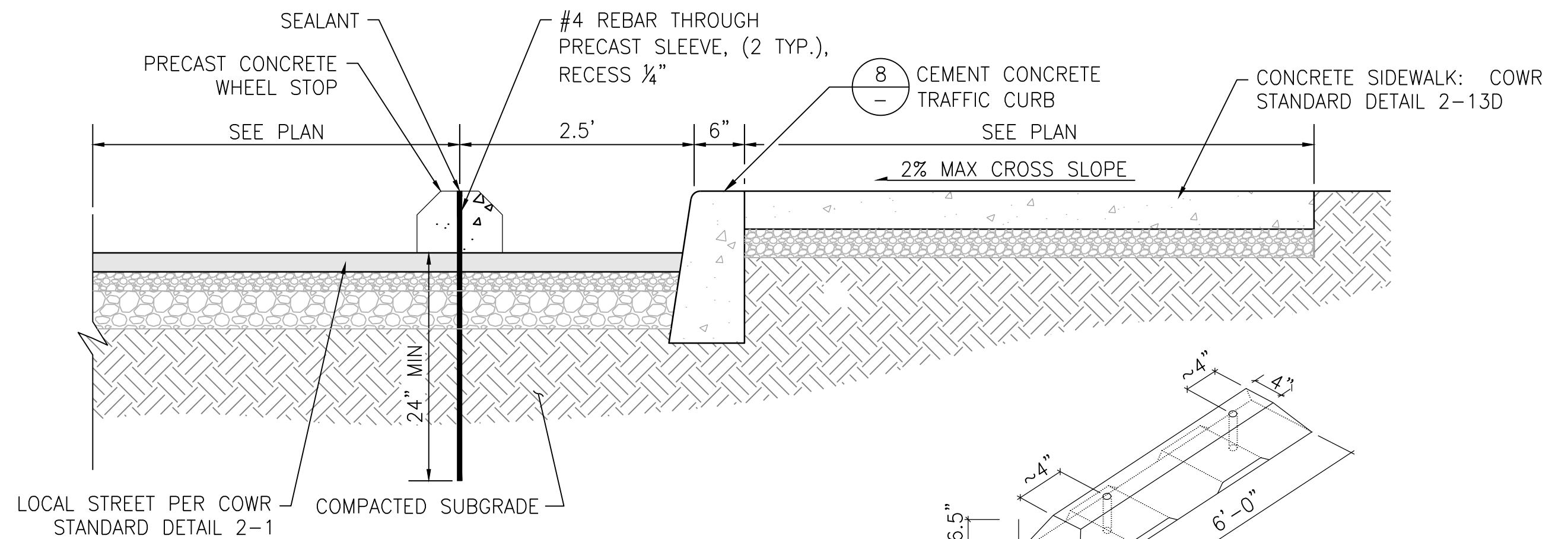


2 CONCRETE SIDEWALK NOT TO SCALE

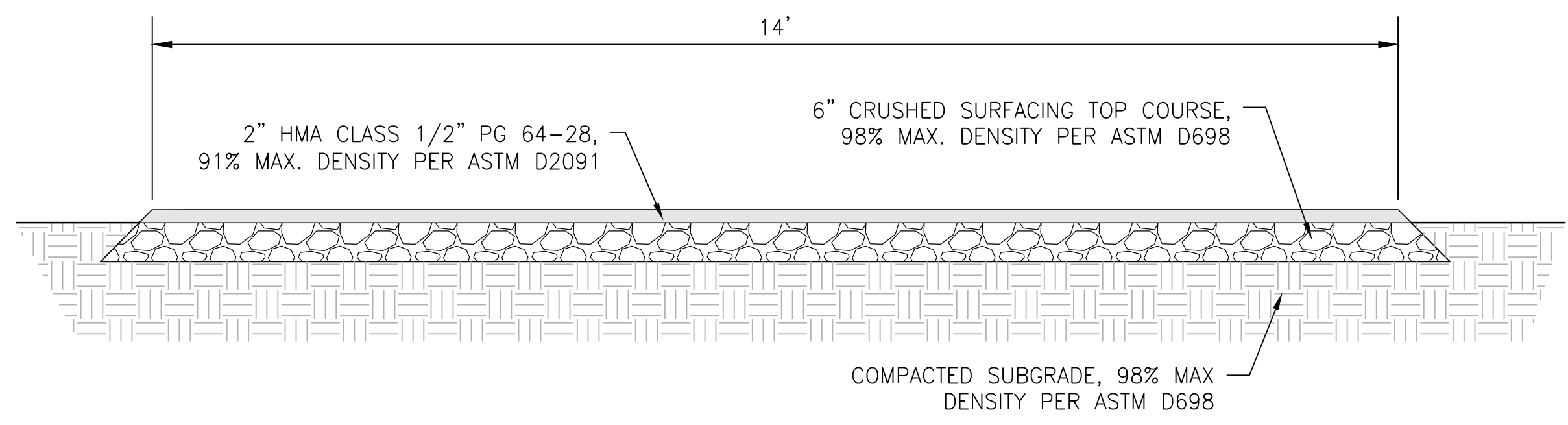


3 SITE FURNISHING MOUNTING PAD NOT TO SCALE

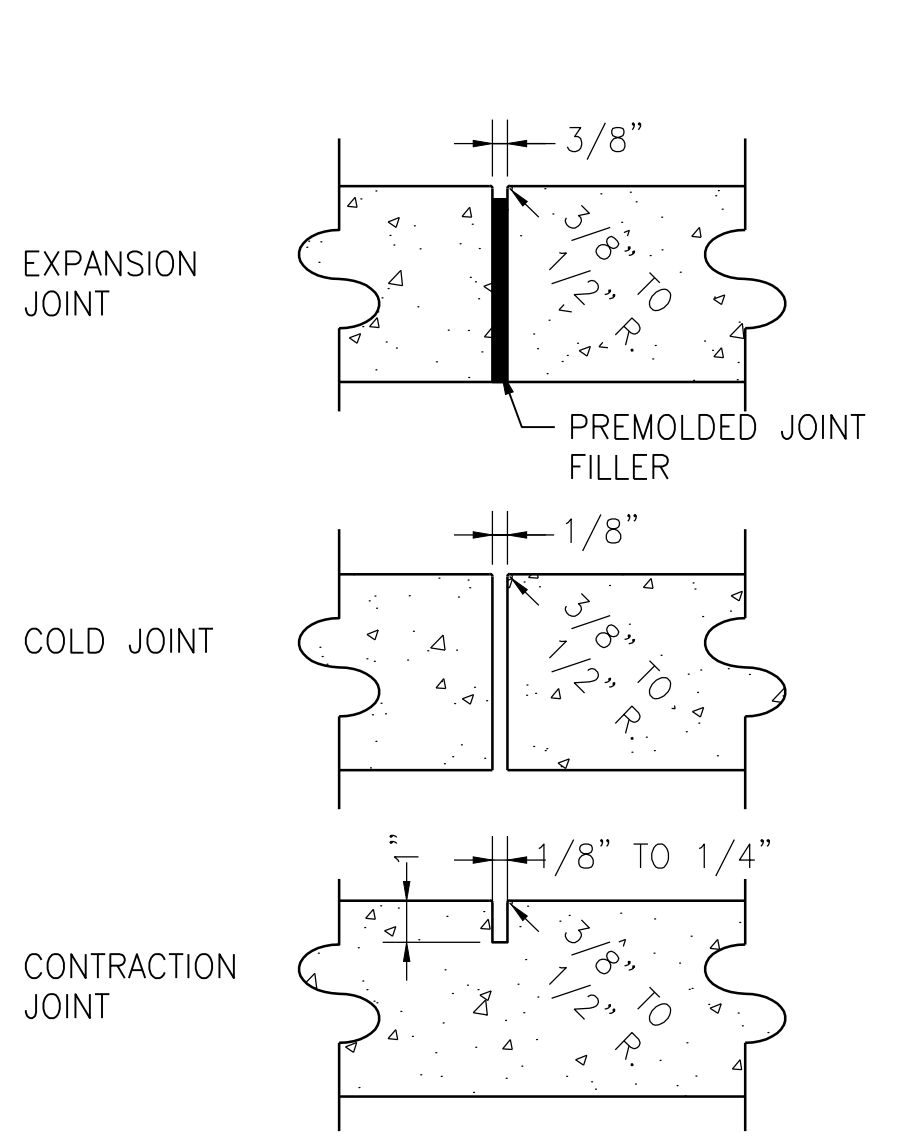
WIDTH OF THICKENED SECTION:  
 X' FOR PICNIC TABLES  
 X' FOR TRASH RECEPTACLES  
 X' FOR BENCHES



4 PARKING LOT SECTION NOT TO SCALE



5 ASPHALT LEVEE ACCESS APRON NOT TO SCALE



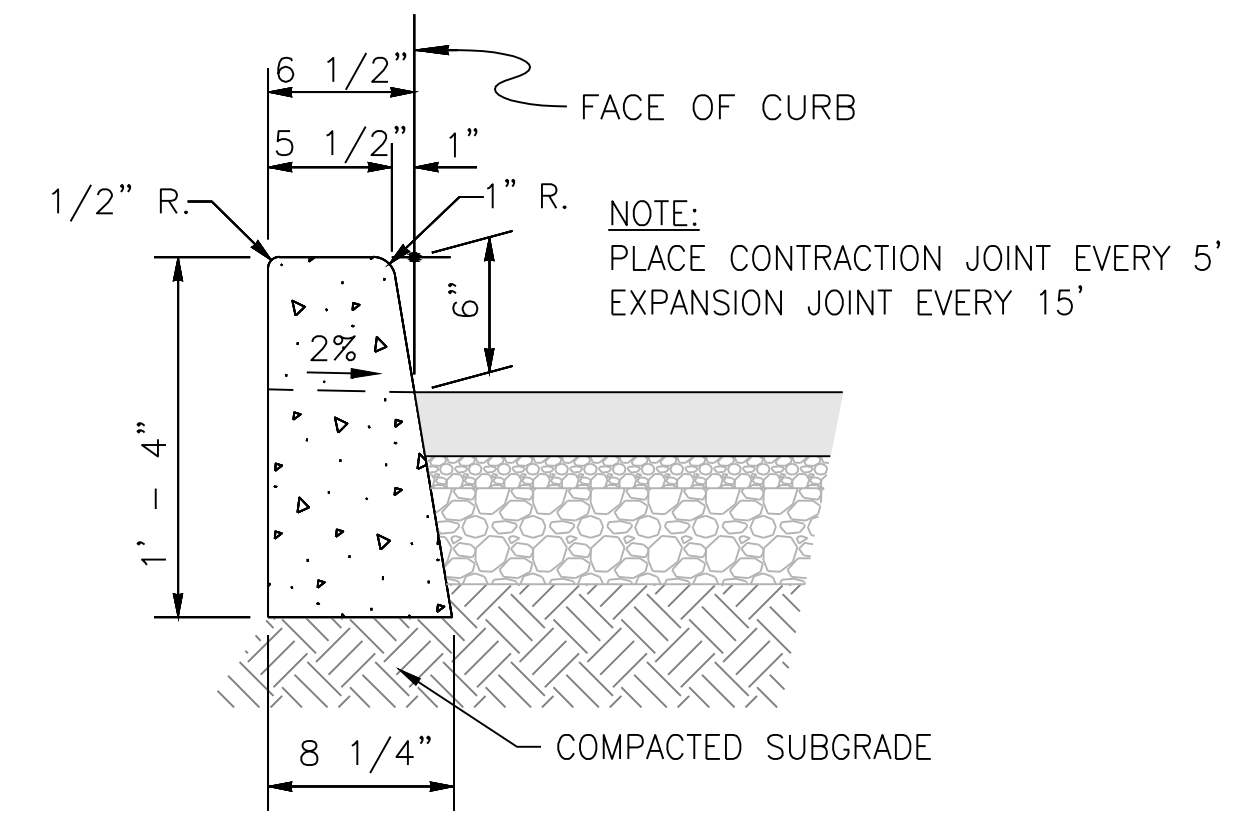
6 CONCRETE JOINTS NOT TO SCALE

JOINT INTERVAL / SPACING

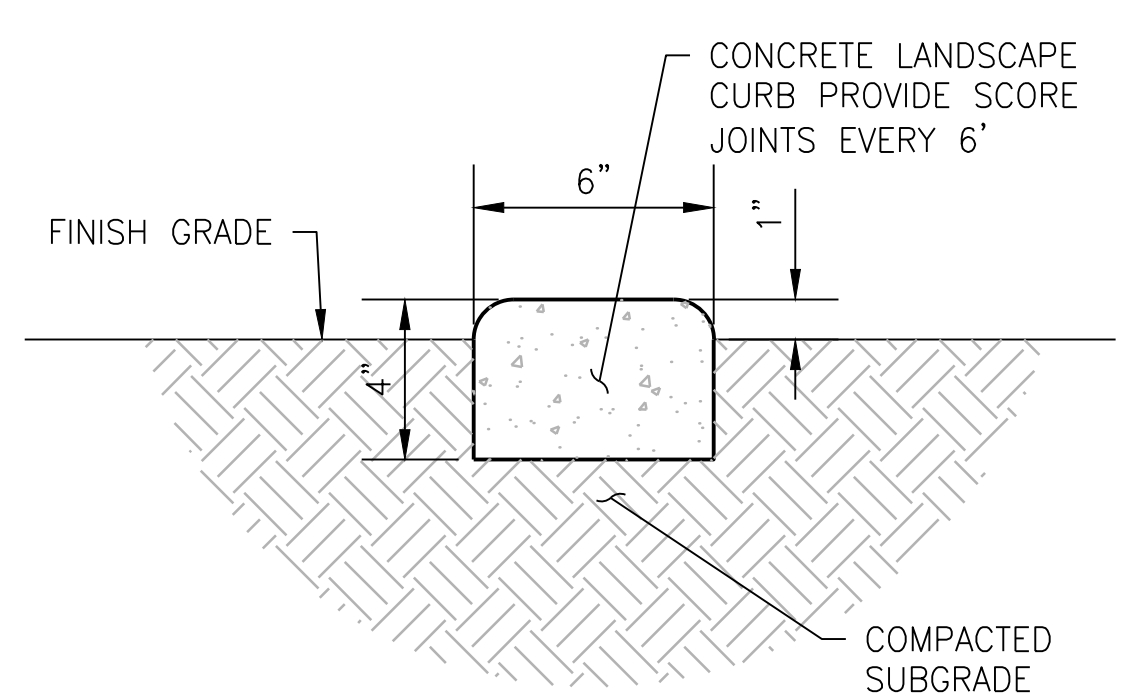
	CONTRACTION JOINT	EXPANSION JOINT
5' SIDEWALK	5'	30'
6' SIDEWALK	6'	30'
8' SIDEWALK	4'	28'
10' SIDEWALK	5'	30'
SLAB	SEE PLAN	12' MAX

Labels: 6'-0", 6'-0", 12' PATTERN, 4'-0", 4'-0", 8' PATTERN, 5'-0", 5'-0", 10' PATTERN.

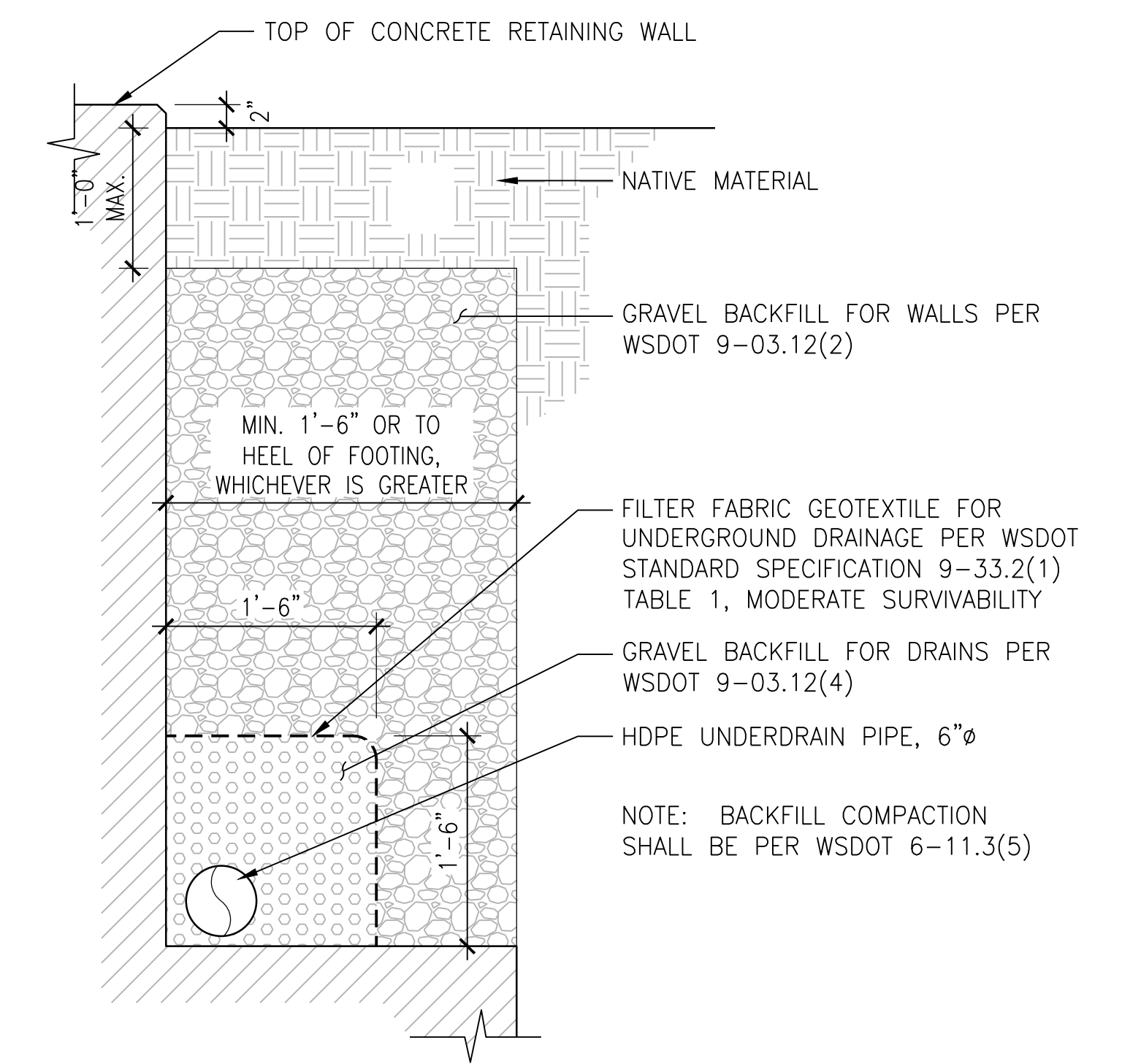
7 CONCRETE FINISH DETAIL NOT TO SCALE



8 CEMENT CONCRETE TRAFFIC CURB NOT TO SCALE



9 LANDSCAPE CURB NOT TO SCALE



10 TYPICAL WALL DRAIN SCALE: 1" = 1'-0"

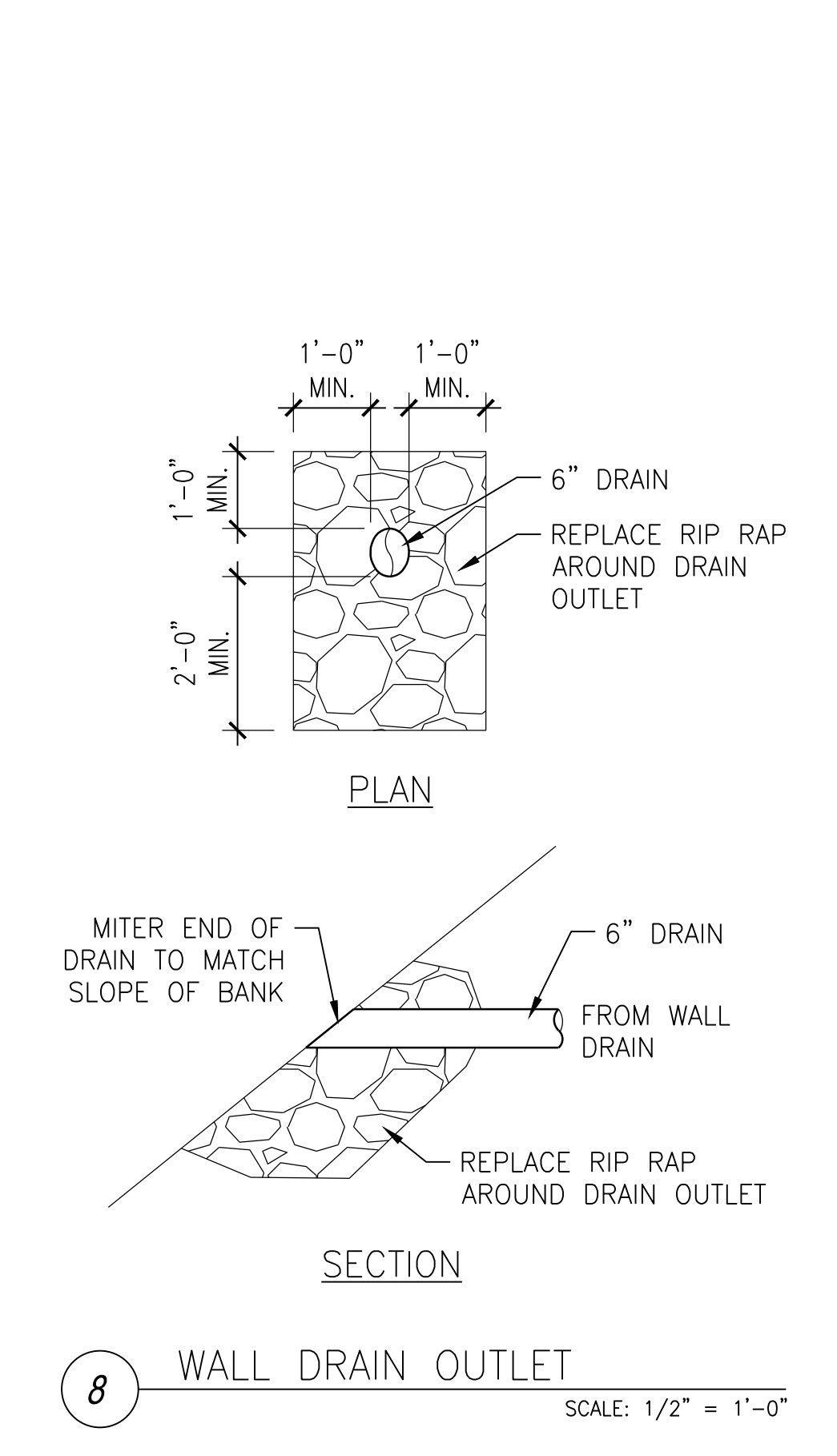
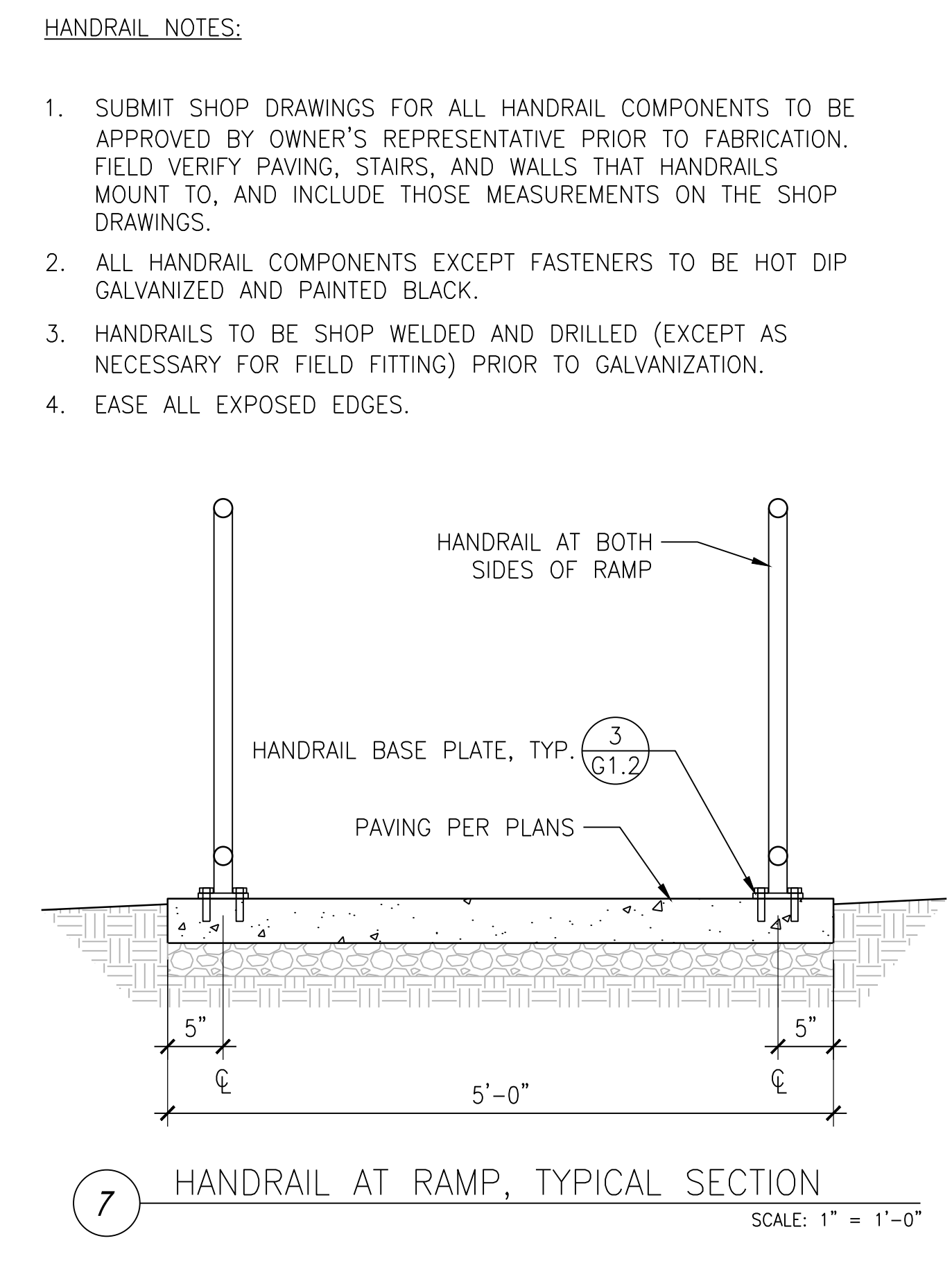
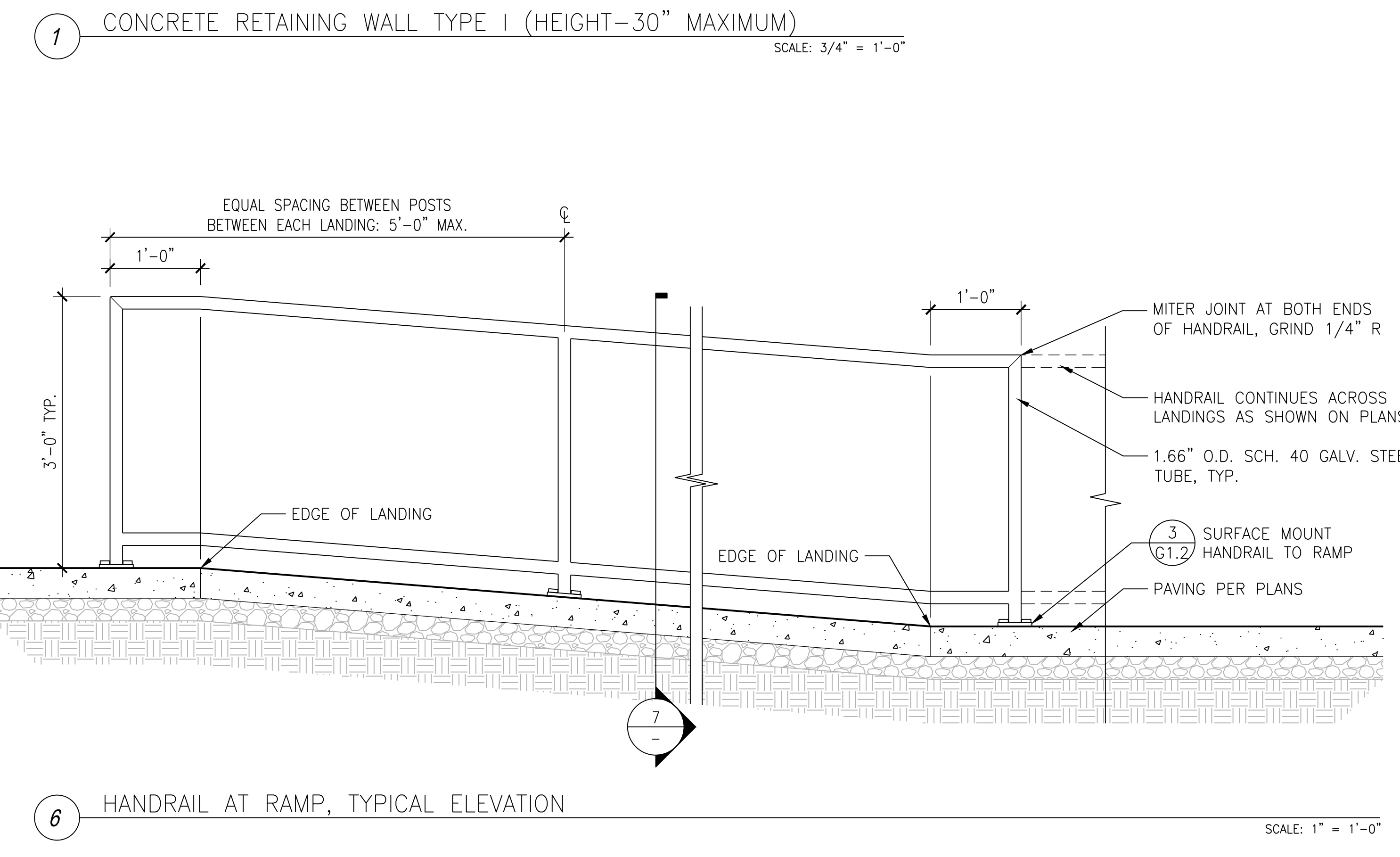
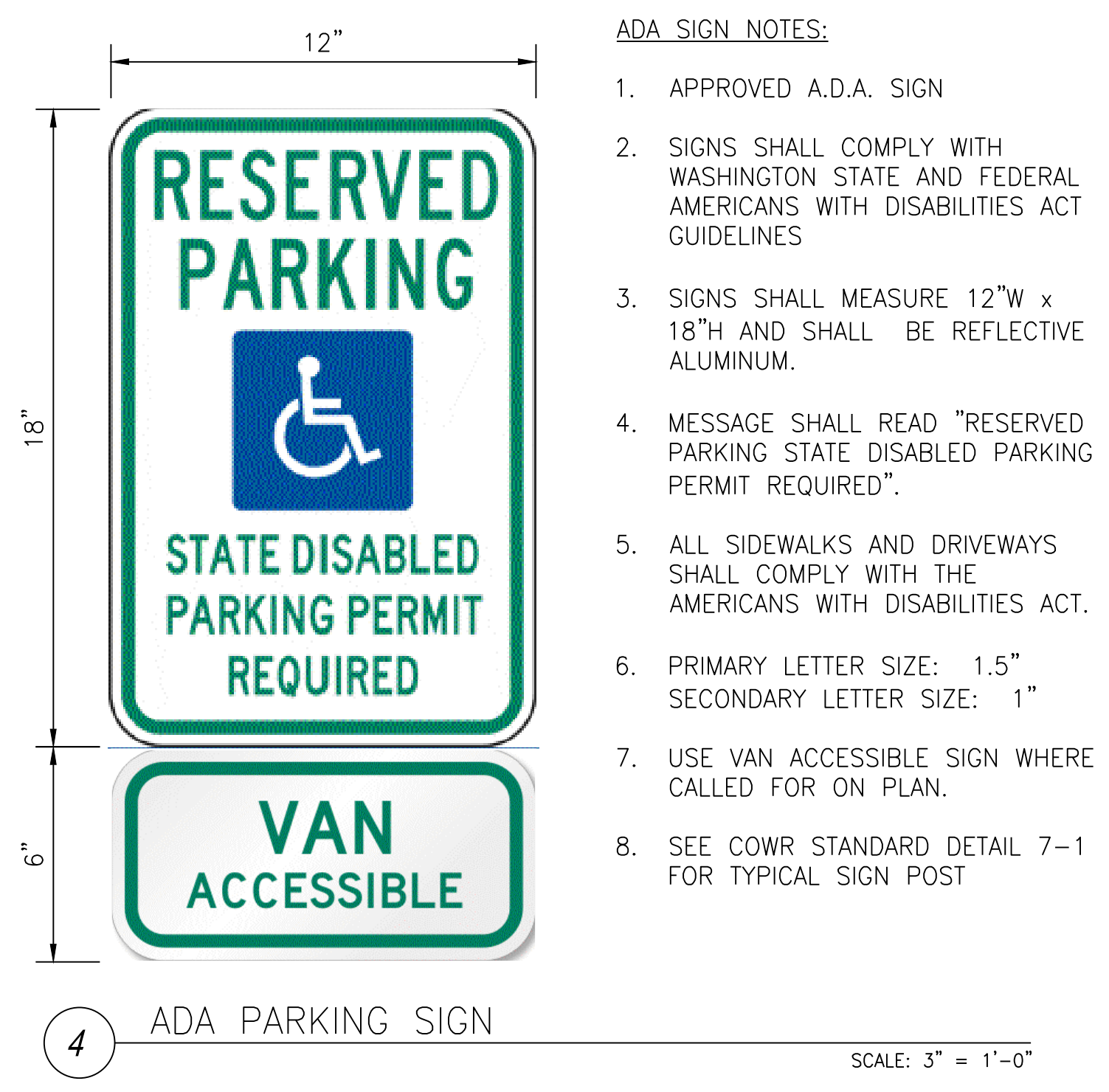
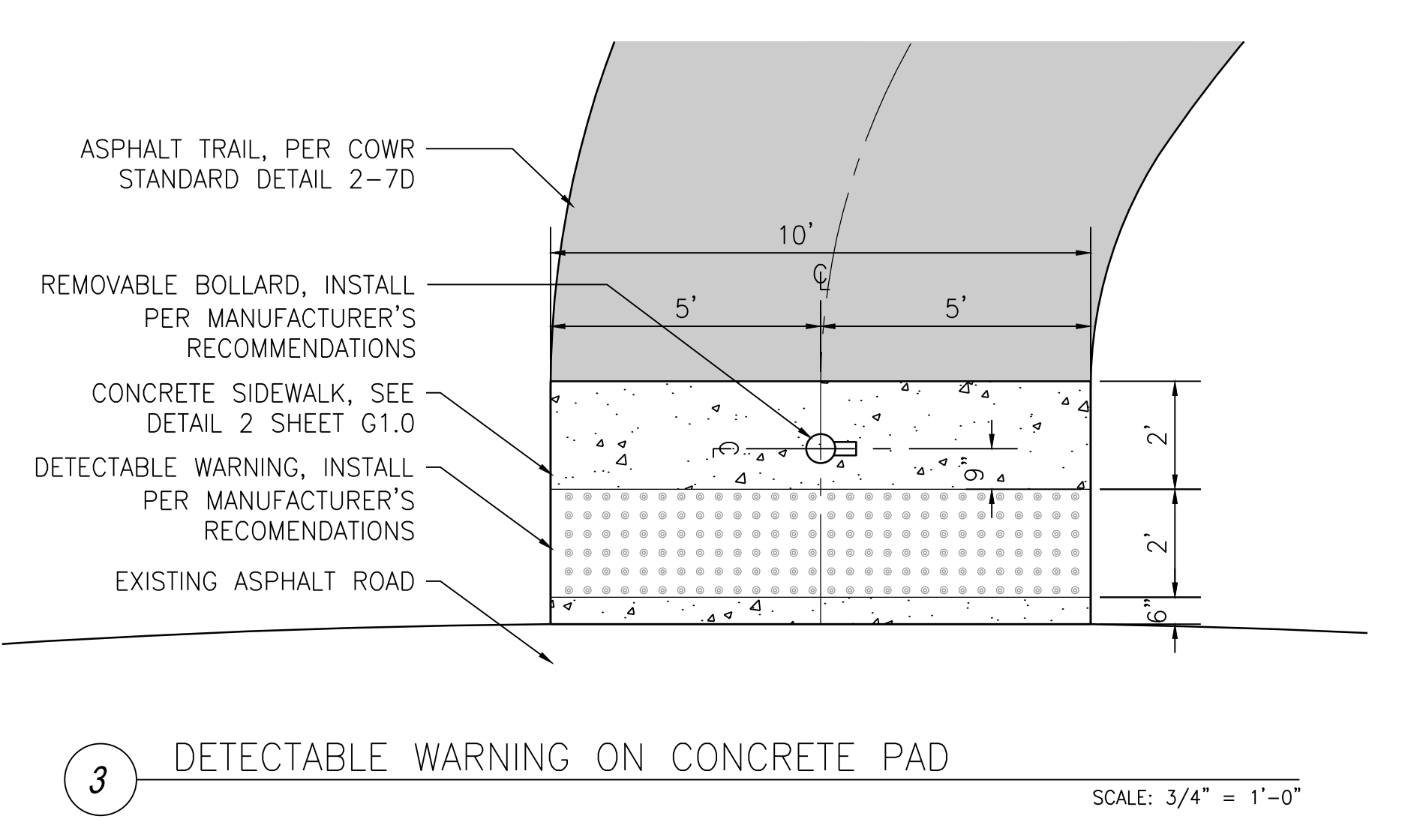
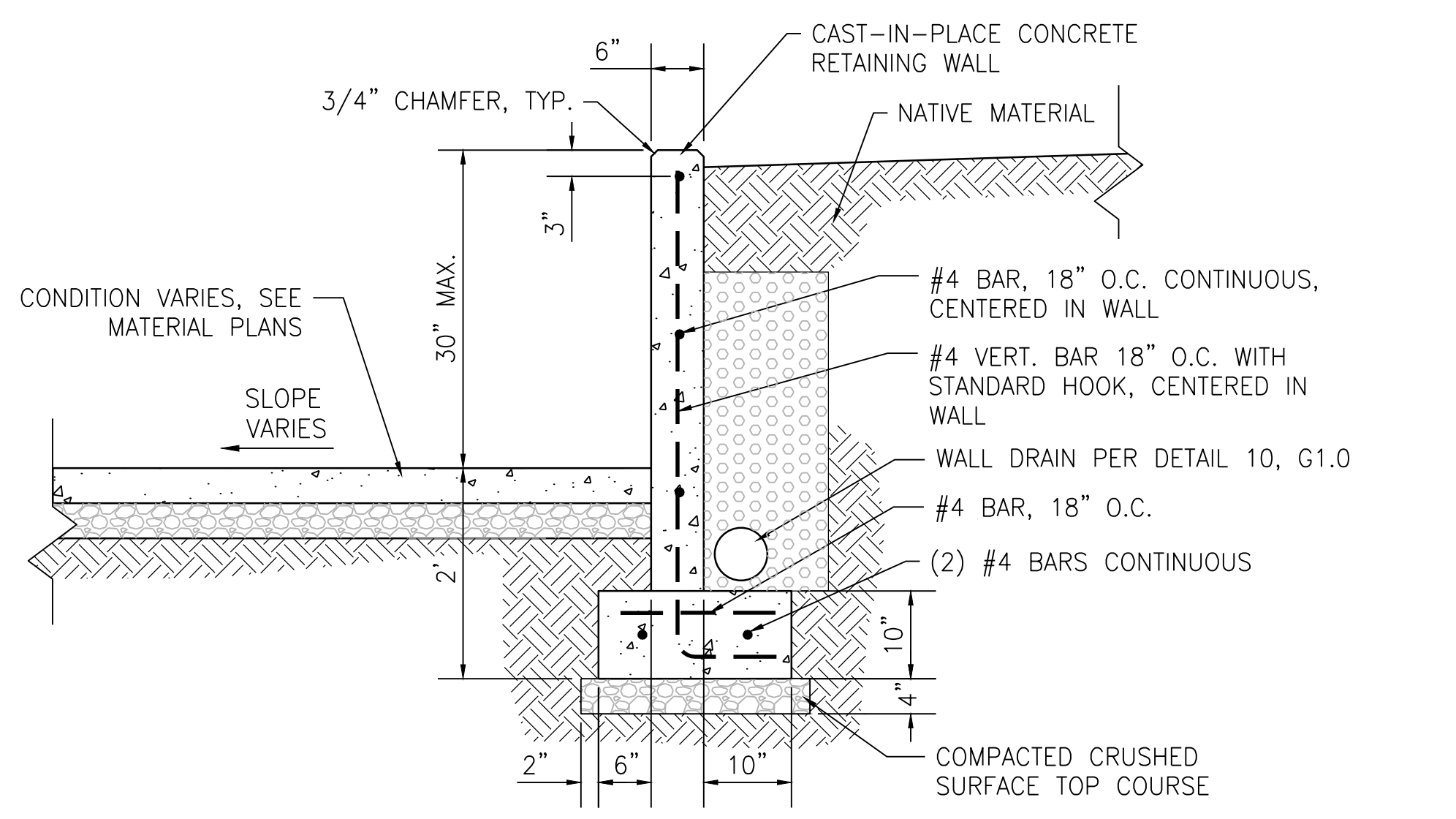
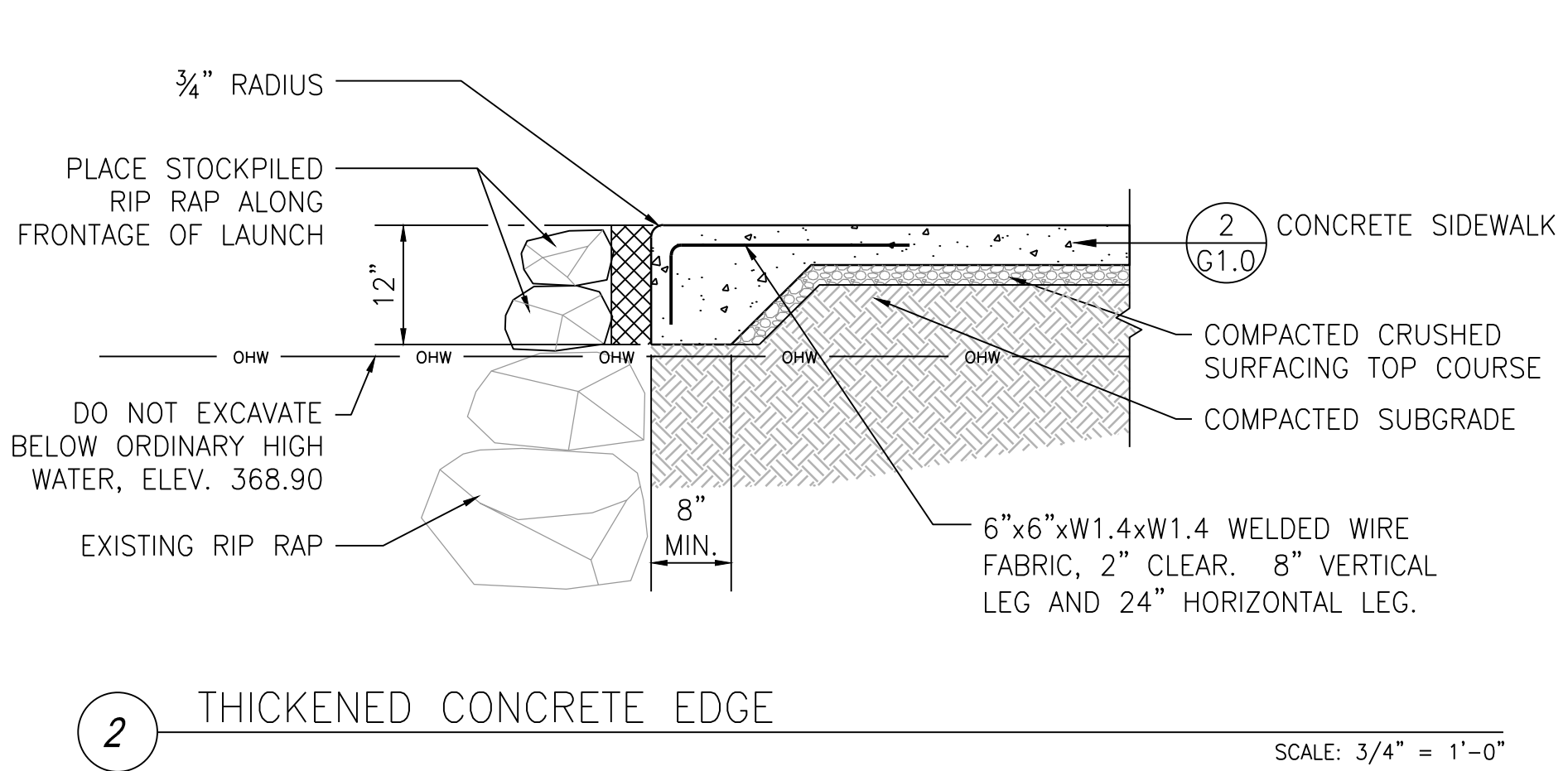
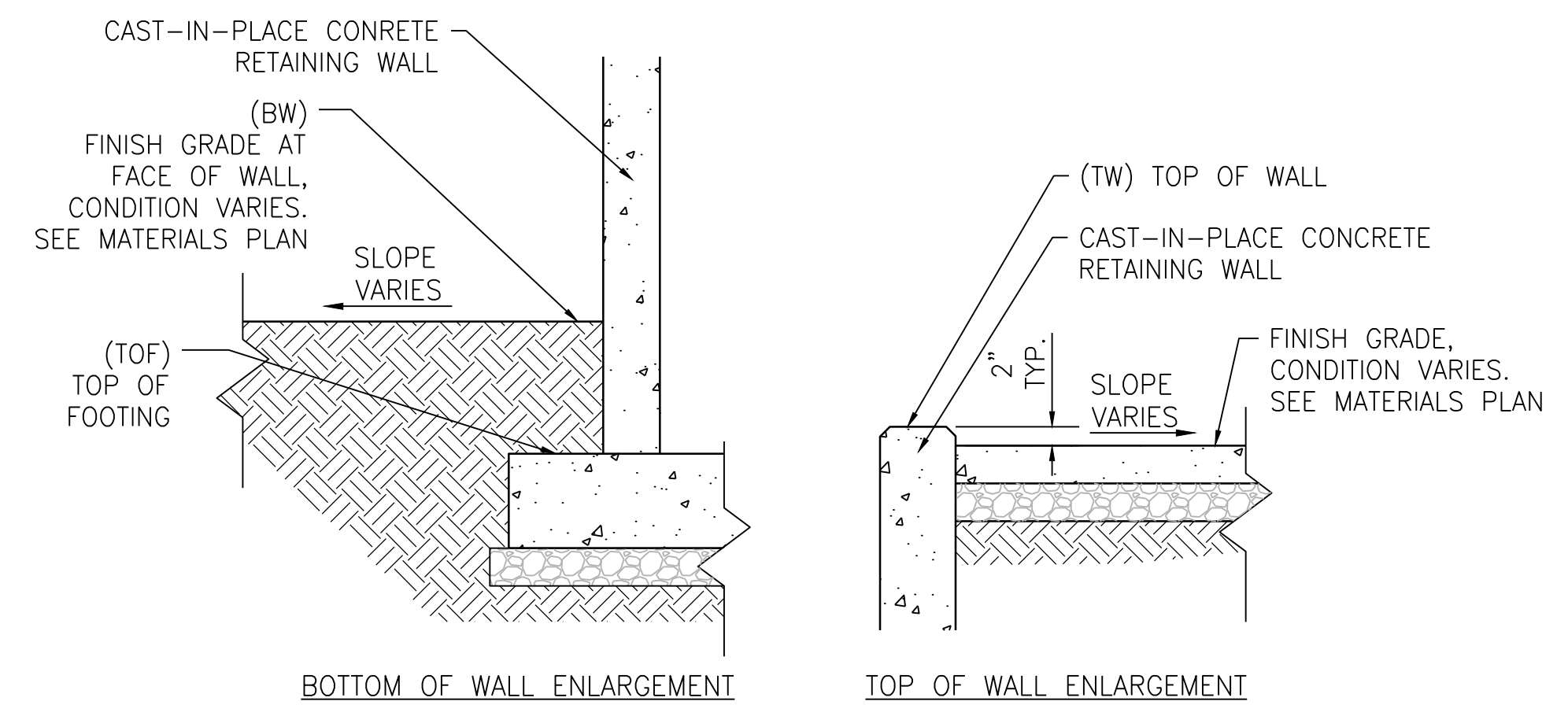
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 CONSTRUCTION

REVISIONS:


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 DRAWN BY: EM  
 CHECKED BY:

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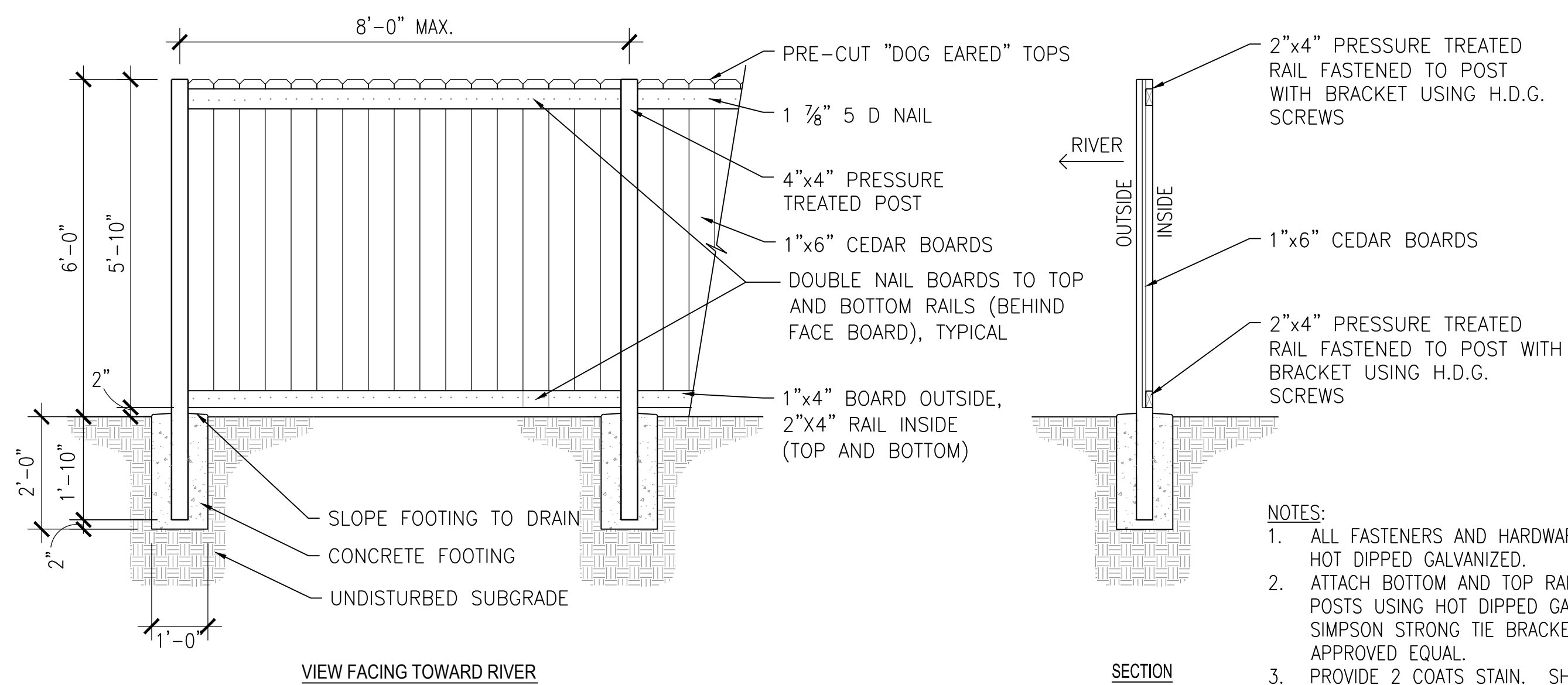
- HANDRAIL NOTES:
1. SUBMIT SHOP DRAWINGS FOR ALL HANDRAIL COMPONENTS TO BE APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO FABRICATION. FIELD VERIFY PAVING, STAIRS, AND WALLS THAT HANDRAILS MOUNT TO, AND INCLUDE THOSE MEASUREMENTS ON THE SHOP DRAWINGS.
  2. ALL HANDRAIL COMPONENTS EXCEPT FASTENERS TO BE HOT DIP GALVANIZED AND PAINTED BLACK.
  3. HANDRAILS TO BE SHOP WELDED AND DRILLED (EXCEPT AS NECESSARY FOR FIELD FITTING) PRIOR TO GALVANIZATION.
  4. EASE ALL EXPOSED EDGES.

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90% PLAN SET

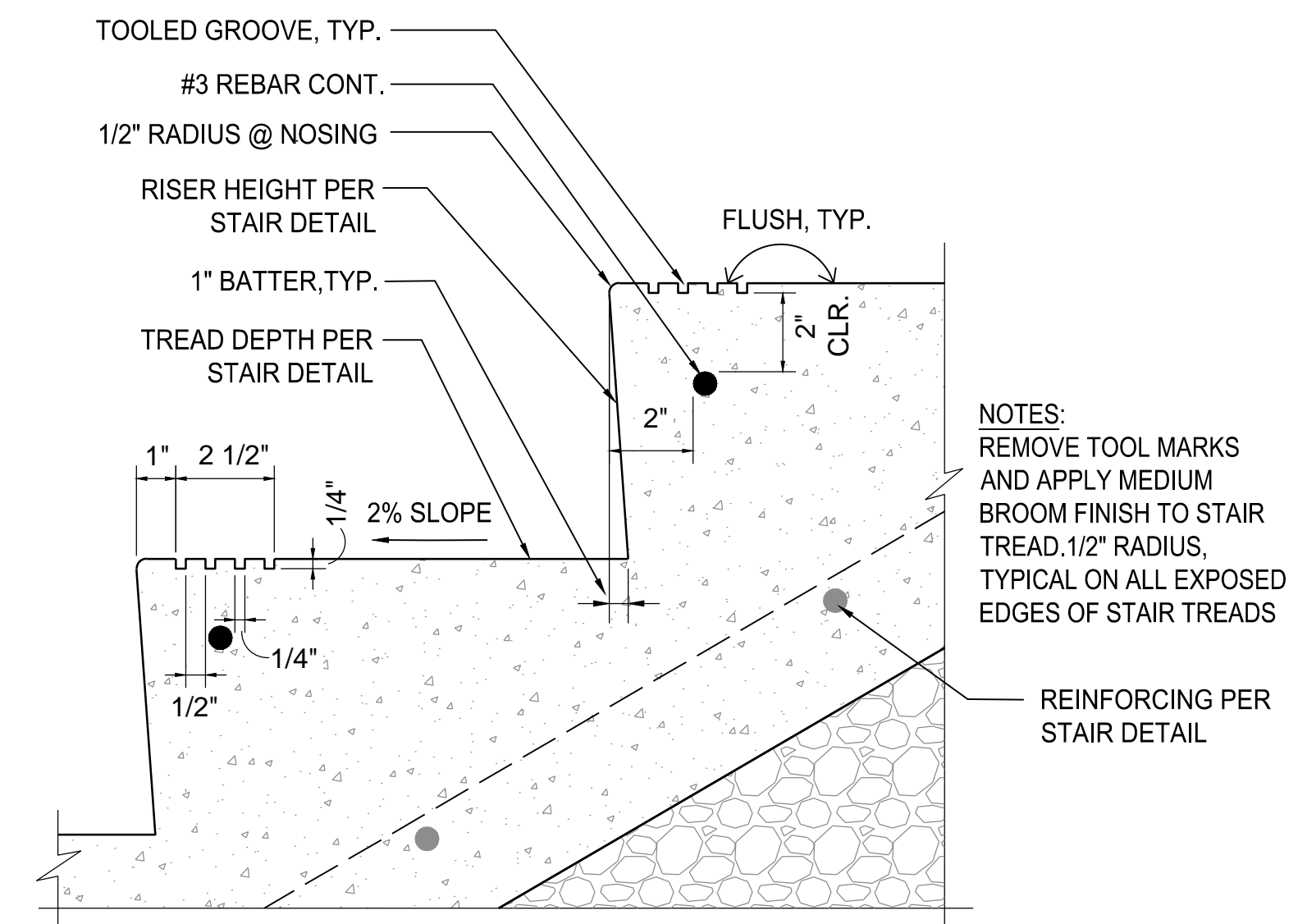


**NOTES:**

1. ALL FASTENERS AND HARDWARE TO BE HOT DIPPED GALVANIZED.
2. ATTACH BOTTOM AND TOP RAILS TO POSTS USING HOT DIPPED GALVANIZED SIMPSON STRONG TIE BRACKETS, OR APPROVED EQUAL.
3. PROVIDE 2 COATS STAIN. SHERWIN WILLIAMS - SEMI TRANSPARENT - CEDAR BARK - SW 3511 OR CLEAR. (OR APPROVED EQUAL)

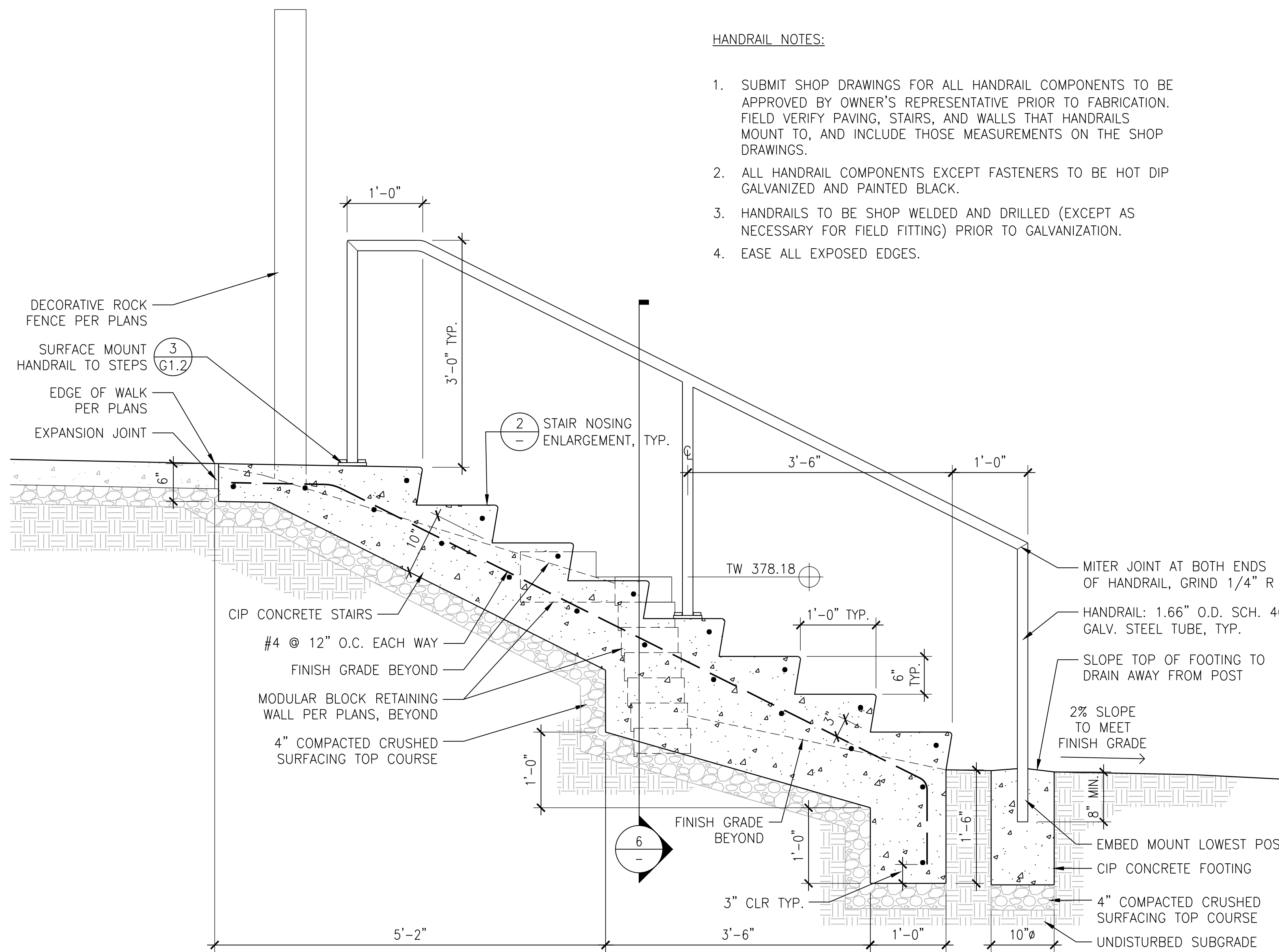
1 CEDAR FENCE

SCALE: 1/2" = 1'-0"



2 STAIR NOSING ENLARGEMENT

SCALE: 3" = 1'-0"

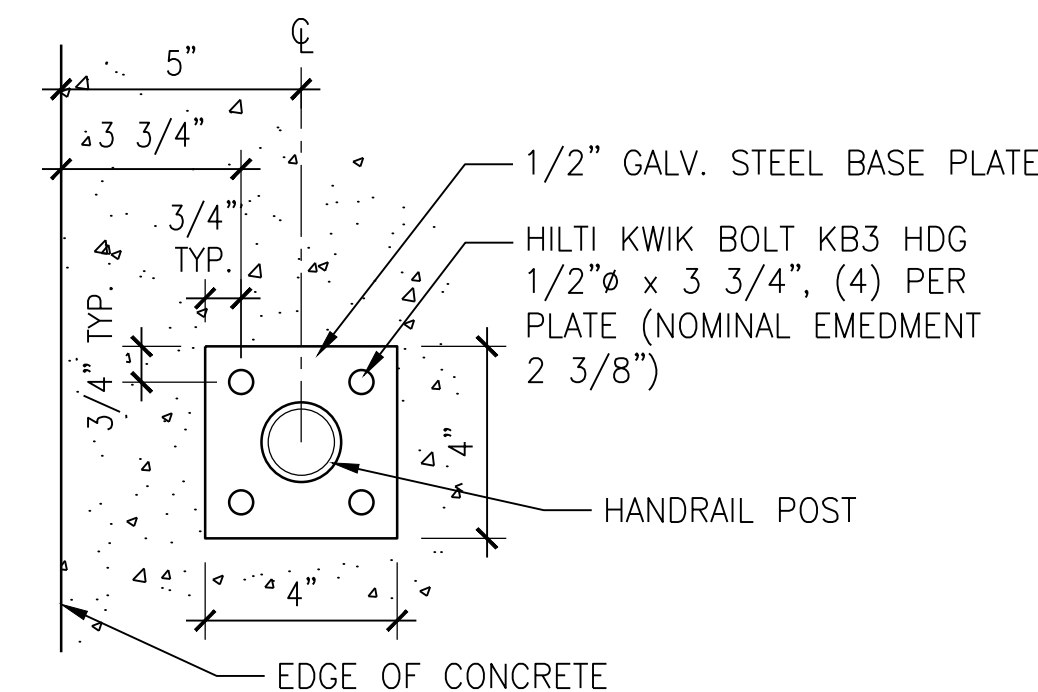


**HANDRAIL NOTES:**

1. SUBMIT SHOP DRAWINGS FOR ALL HANDRAIL COMPONENTS TO BE APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO FABRICATION. FIELD VERIFY PAVING, STAIRS, AND WALLS THAT HANDRAILS MOUNT TO, AND INCLUDE THOSE MEASUREMENTS ON THE SHOP DRAWINGS.
2. ALL HANDRAIL COMPONENTS EXCEPT FASTENERS TO BE HOT DIP GALVANIZED AND PAINTED BLACK.
3. HANDRAILS TO BE SHOP WELDED AND DRILLED (EXCEPT AS NECESSARY FOR FIELD FITTING) PRIOR TO GALVANIZATION.
4. EASE ALL EXPOSED EDGES.

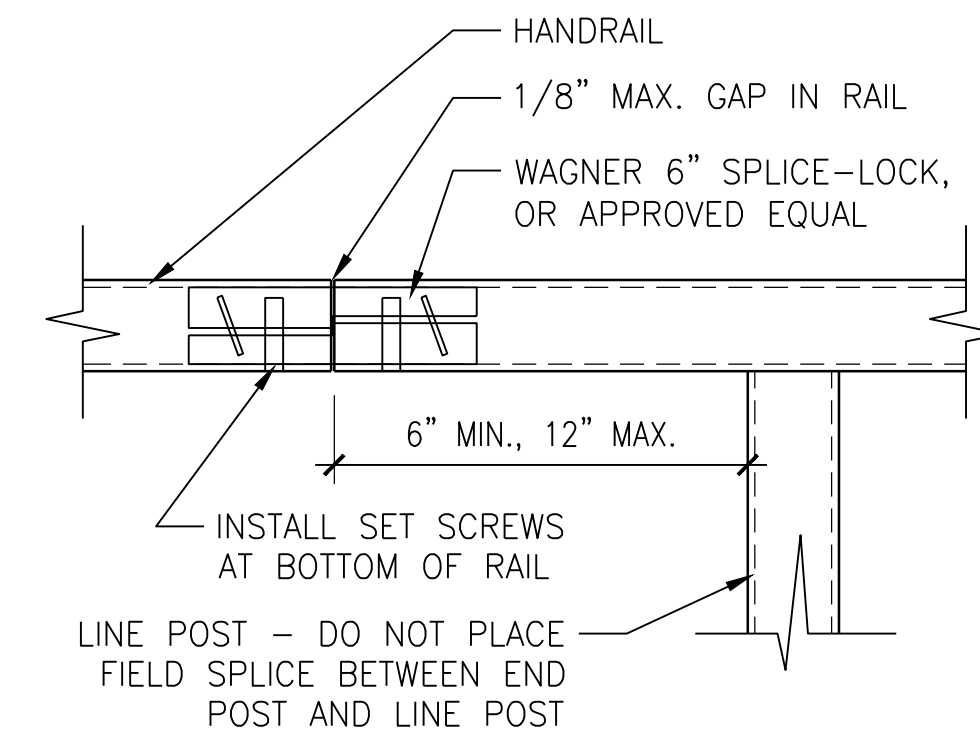
5 STAIRS #3

SCALE: 1" = 1'-0"



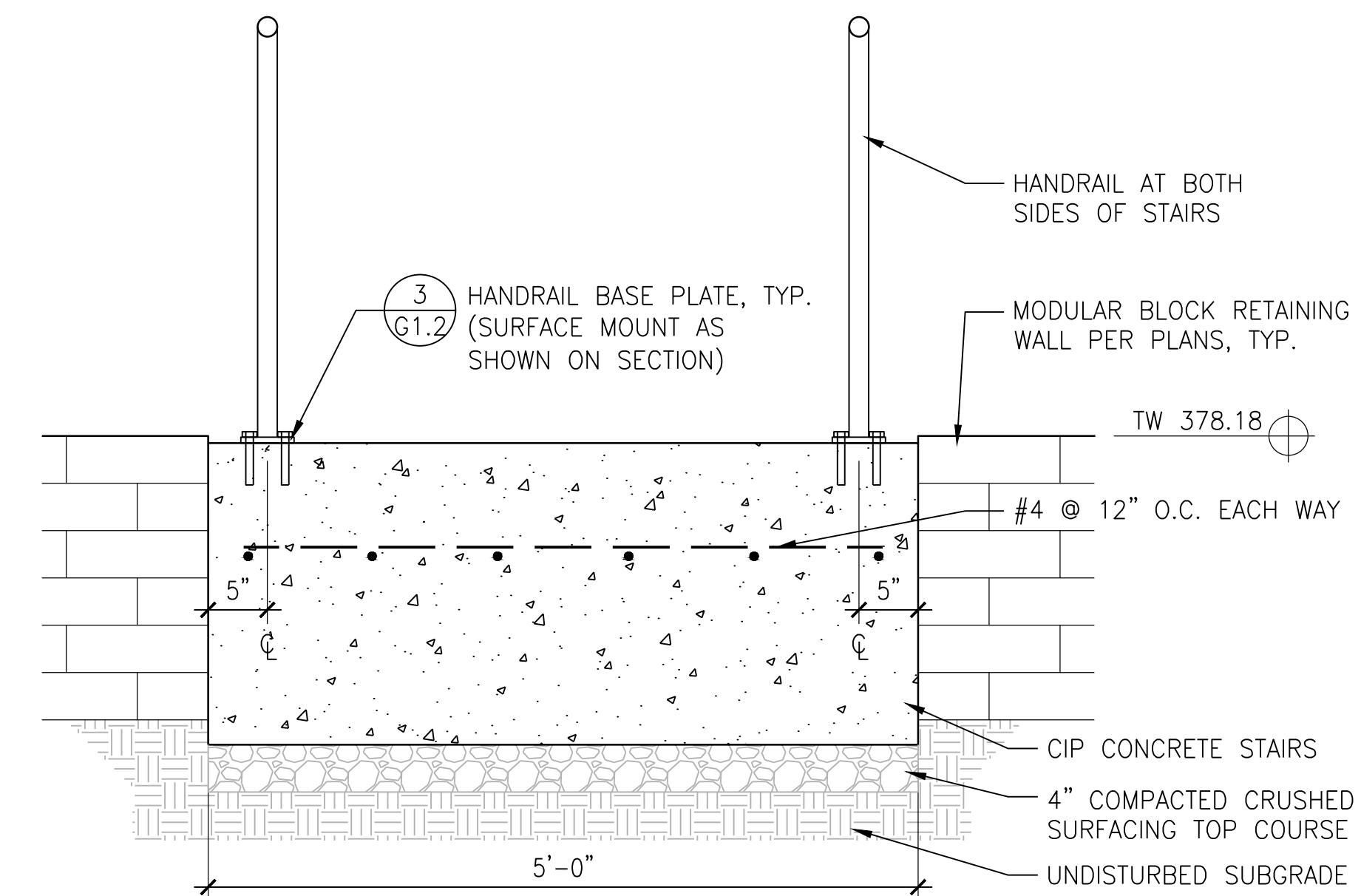
3 HANDRAIL BASE PLATE

SCALE: 3" = 1'-0"



4 HANDRAIL FIELD SPLICE

SCALE: 3" = 1'-0"



6 STAIRS #3 SECTION

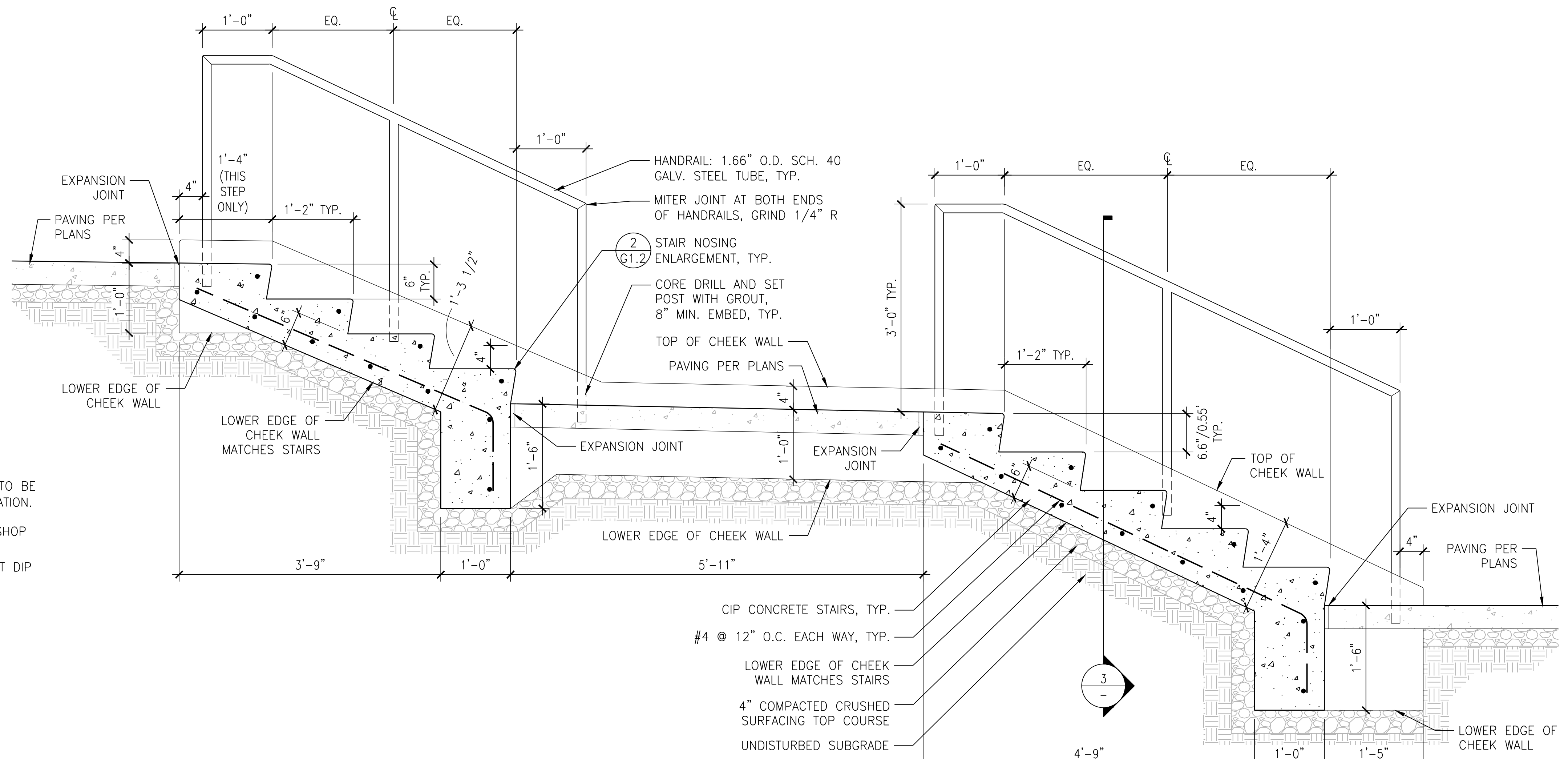
SCALE: 1" = 1'-0"

REVISIONS:


JOB NO.: 15918  
DATE: 12/23/2015  
SCALE: AS SHOWN  
DESIGNED BY: BC  
DRAWN BY: EM  
CHECKED BY:



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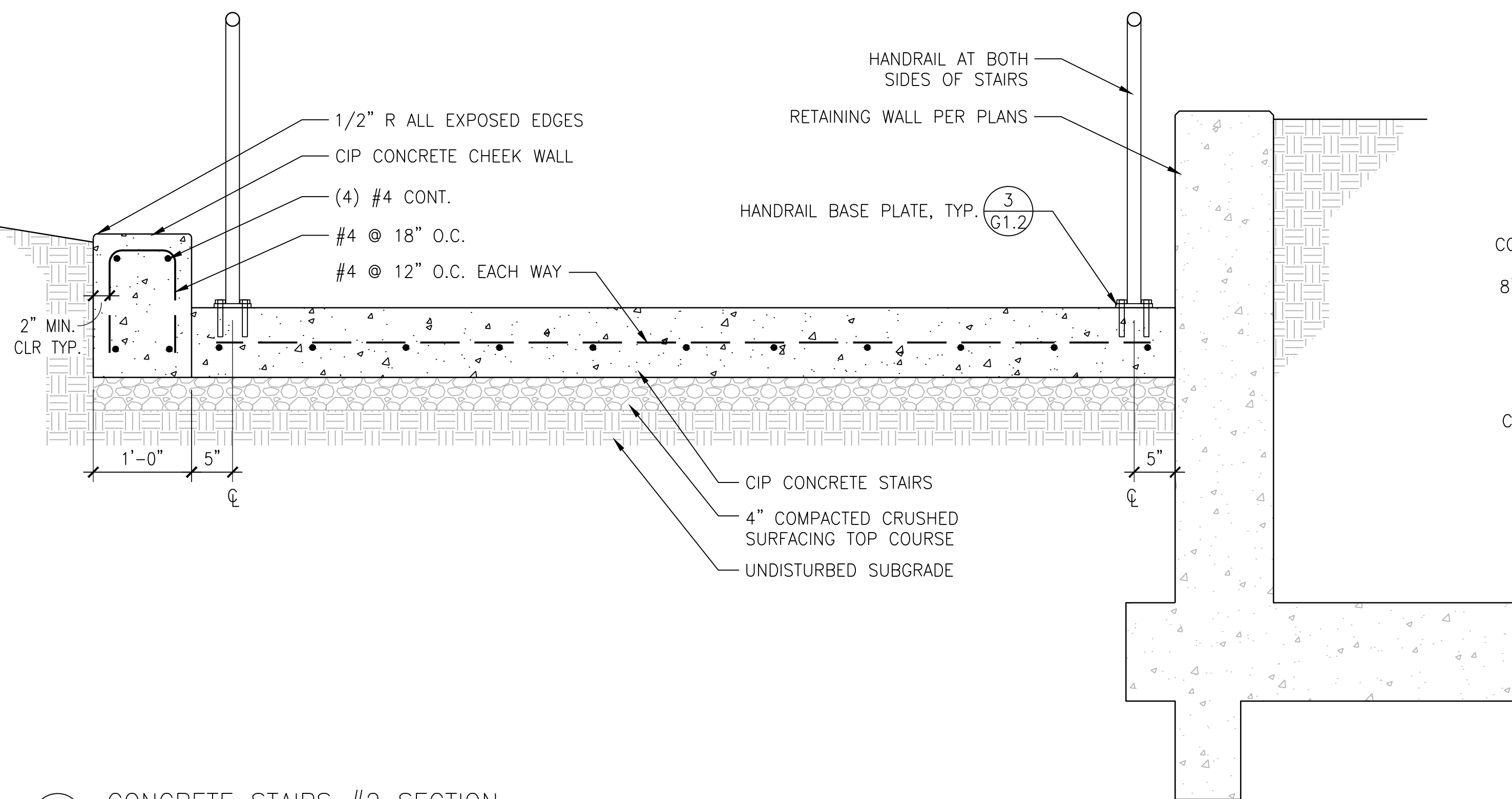


**HANDRAIL NOTES:**

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4. EASE ALL EXPOSED EDGES.

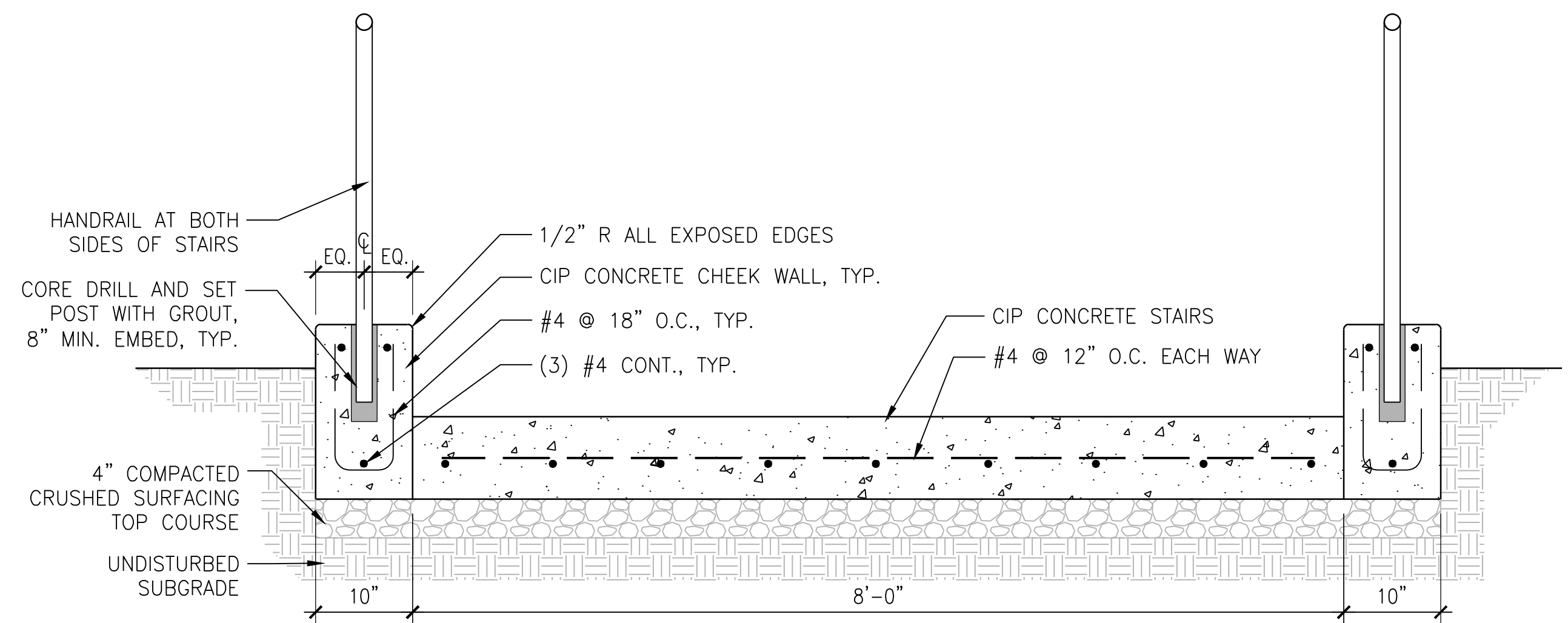
1 CONCRETE STAIRS #1

SCALE: 1" = 1'-0"



2 CONCRETE STAIRS #2 SECTION

SCALE: 1" = 1'-0"



3 CONCRETE STAIRS #1 SECTION

SCALE: 1" = 1'-0"

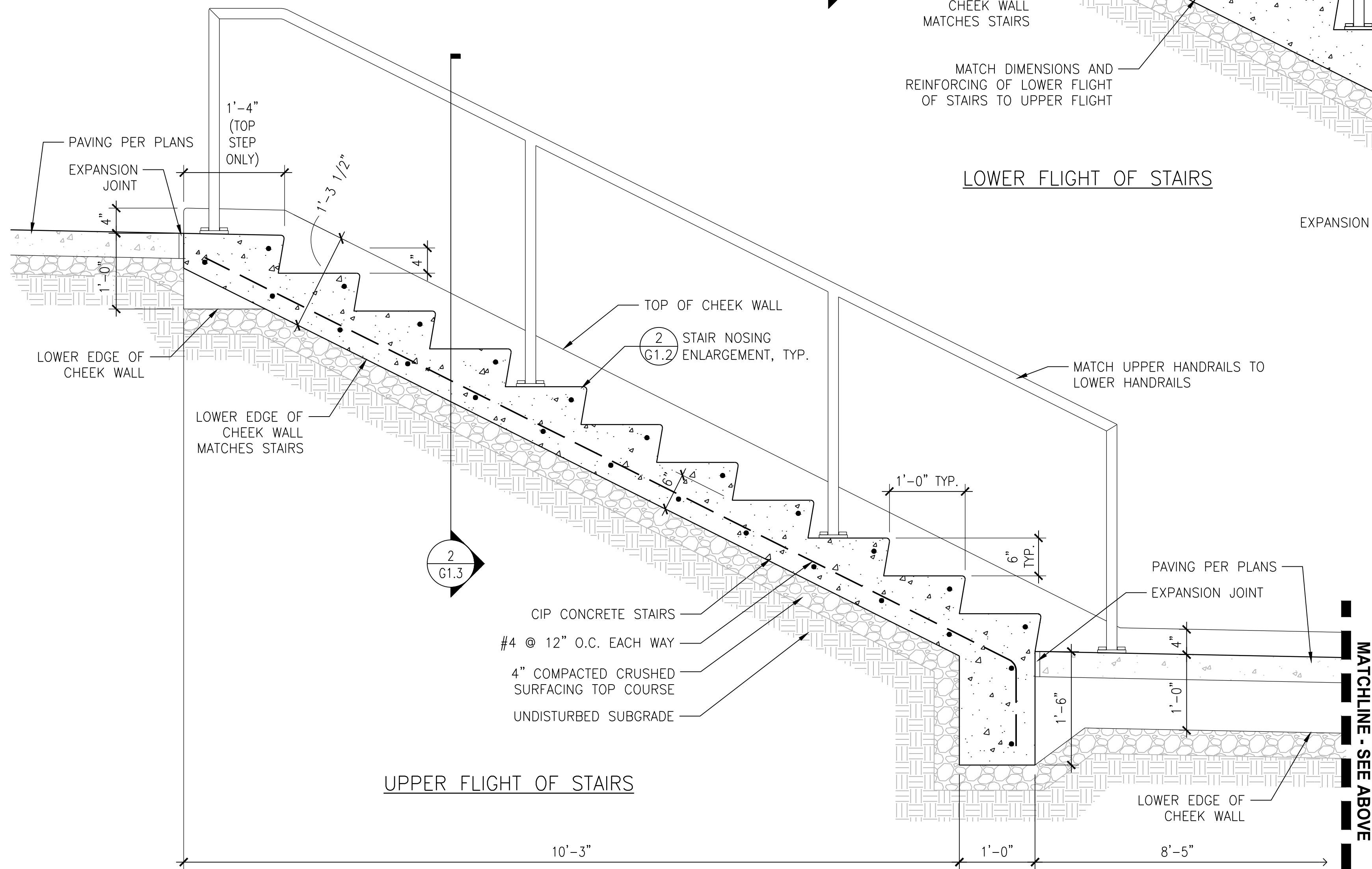
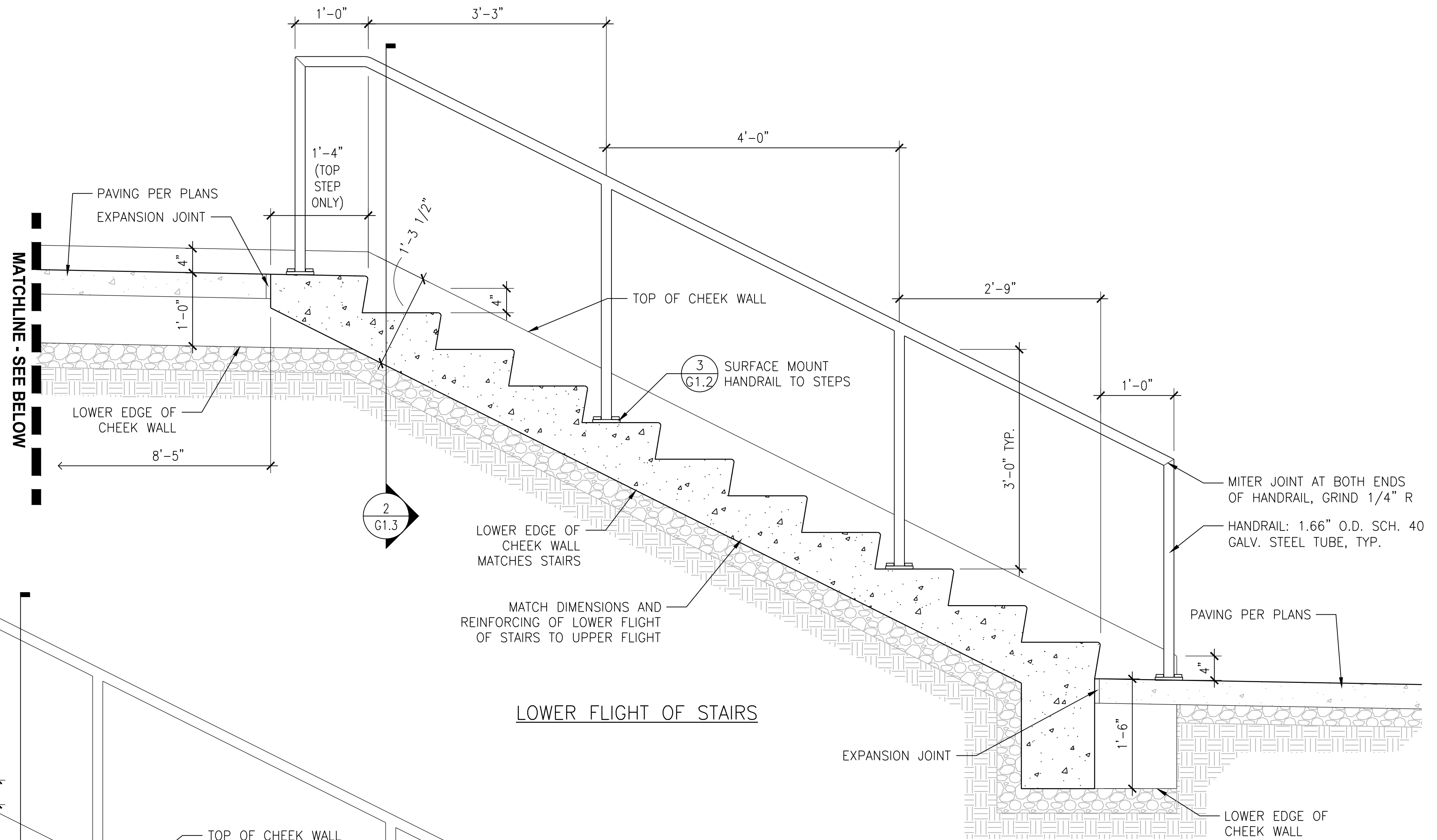
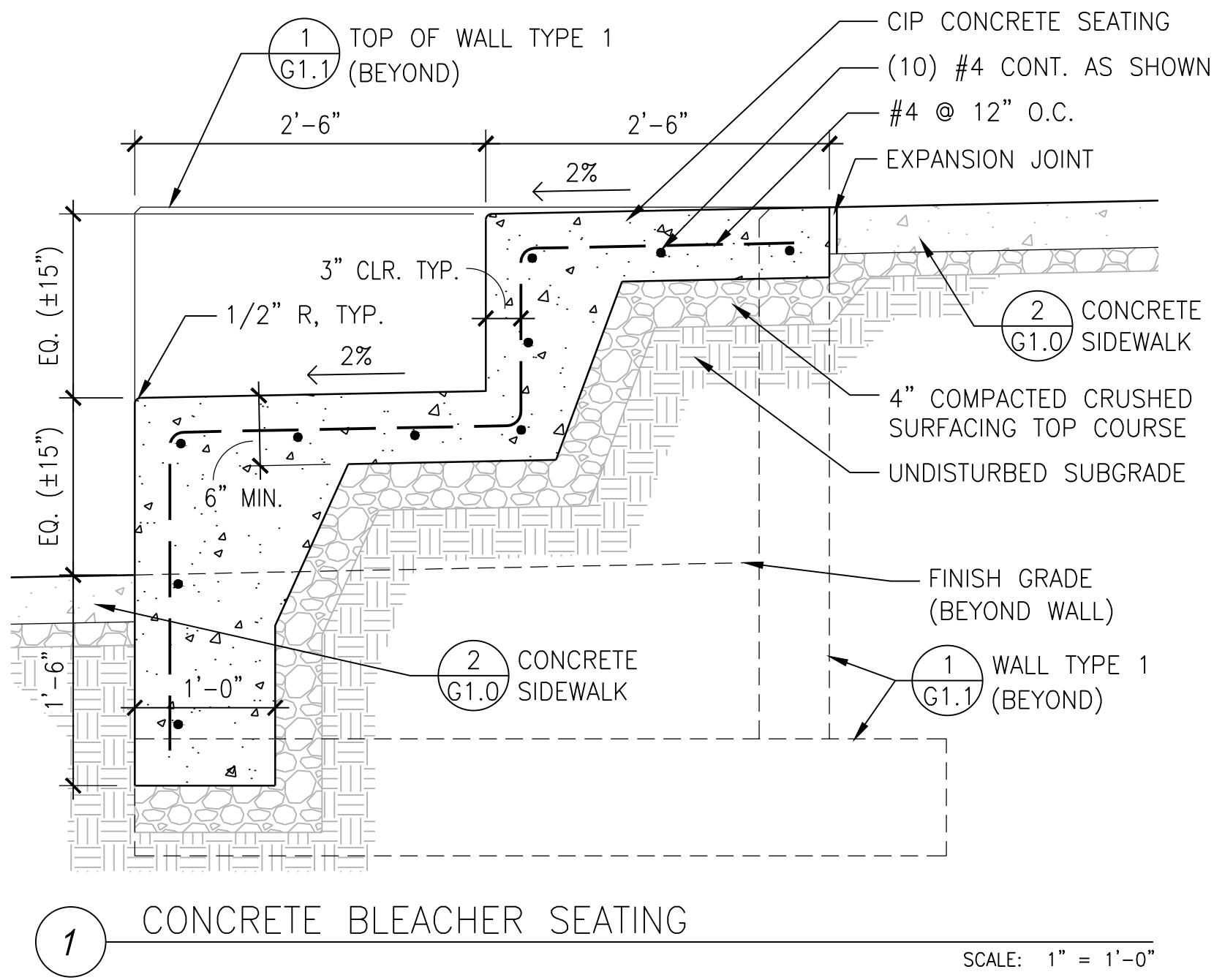
PRELIMINARY  
NOT FOR  
CONSTRUCTION

REVISIONS:

JOB NO.: 15918  
DATE: 12/23/2015  
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DESIGNED BY: BC  
DRAWN BY: EM  
CHECKED BY:

90% PLAN  
SET

FILE: K:\15918 - YAKIMA RIVER GATEWAY\PROJECT\CIVIL\DWGS\SHEETS\15918 - G1.X - DETAILS & SECTIONS.DWG



HANDRAIL NOTES:

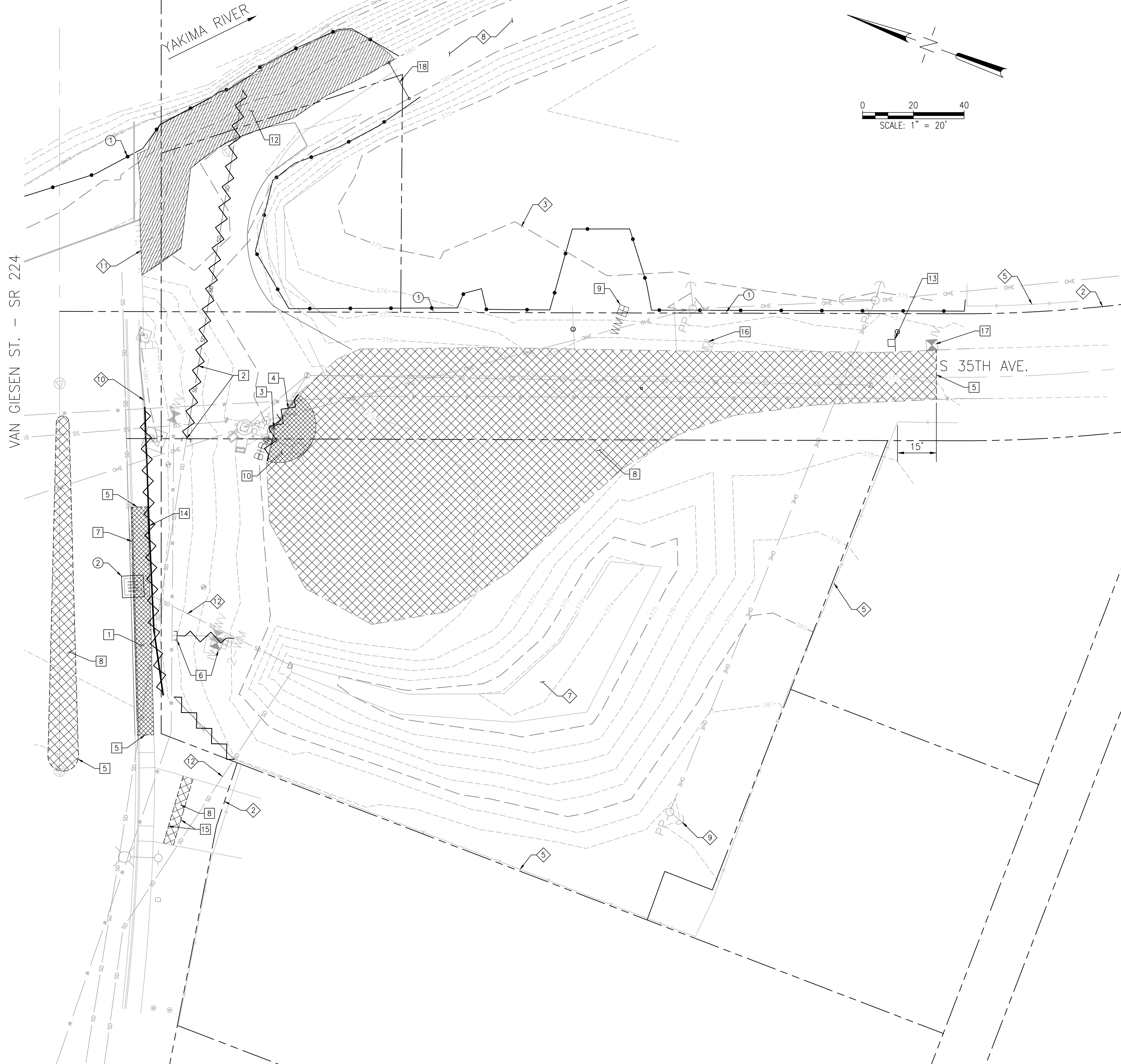
1. SUBMIT SHOP DRAWINGS FOR ALL HANDRAIL COMPONENTS TO BE APPROVED BY OWNER'S REPRESENTATIVE PRIOR TO FABRICATION. FIELD VERIFY PAVING, STAIRS, AND WALLS THAT HANDRAILS MOUNT TO, AND INCLUDE THOSE MEASUREMENTS ON THE SHOP DRAWINGS.
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REVISIONS:

JOB NO.:	15918
DATE:	12/23/2015
SCALE:	AS SHOWN
DESIGNED BY:	BC
DRAWN BY:	EM
CHECKED BY:	

90% PLAN SET

G1.4



**GENERAL NOTES**

- PROTECT ALL SITE ELEMENTS WHICH ARE NOT INDICATED FOR REMOVAL, INCLUDING BUT NOT LIMITED TO FURNISHINGS, PAVING, STRUCTURES, UTILITIES, SIGNS, TREES, AND VEGETATION.

**KEY NOTES**

- ① NOT USED
- ② RIGHT-OF-WAY / PROPERTY LINE
- ③ EXISTING GROUND CONTOURS
- ④ NOT USED
- ⑤ EXISTING FENCE, PRESERVE AND PROTECT
- ⑥ EXISTING EDGE OF ASPHALT
- ⑦ EXISTING STORM POND
- ⑧ EXISTING LEVEE ACCESS ROAD
- ⑨ POWER POLE WILL BE RELOCATED PRIOR TO CONSTRUCTION. COORDINATE SCHEDULE FOR RELOCATION WITH BENTON REA AND CITY.
- ⑩ EXISTING GUARDRAIL TO REMAIN
- ⑪ BRIDGE DECK
- ⑫ EXISTING CONCRETE STORM PIPE, PRESERVE AND PROTECT

**EROSION CONTROL NOTES**

- ① SILT FENCE, SEE DETAIL 1, SHEET C1.5
- ② CATCH BASIN PROTECTION, SEE DETAIL 2, SHEET C1.5

**DEMOLITION NOTES**

- ① DEMOLISH AND DISPOSE OFFSITE EXISTING CONCRETE SIDEWALK
- ② EXISTING STORM CULVERT. REMOVE AND DISPOSE TO LIMITS SHOWN. FILL END OF EXISTING CULVERT WITH CONCRETE AT LOCATION SHOWN. BACKFILL TRENCH PER WSDOT STANDARD SPECIFICATION 2-03.3(14)C METHOD C.
- ③ CUT AND CAP EXISTING GRAVITY DRAIN FROM DUMP STATION TO LIFT STATION. CAP EXISTING DUMP STATION. REMOVE AND CAP HOSE BIB LINE. RETAIN AND PROTECT LIFT STATION.
- ④ REMOVE EXISTING CURB AND DISPOSE OFFSITE
- ⑤ SAWCUT EXISTING CONCRETE WALK. SEE SHEETS T1.4 AND T1.5 FOR PROPOSED SIDEWALK AND ROAD IMPROVEMENTS.
- ⑥ REMOVE METERS, RP DEVICE, AND CUT AND CAP EXISTING SERVICE AT CORP STOP
- ⑦ HORIZONTAL SAWCUT EXISTING CURB ALONG DEMO LIMITS, APPROXIMATELY 90'
- ⑧ DEMOLISH AND DISPOSE OFFSITE EXISTING ASPHALT
- ⑨ CUT, CAP, AND REMOVE EXISTING WATER METER. PRIOR TO REMOVING EXISTING WATER METER, ENSURE NEW METER IS IN PLACE FOR MINIMUM OUTAGE TO HOUSE. SEE SHEET C2.0 FOR NEW METER LOCATION.
- ⑩ DEMOLISH AND DISPOSE OFFSITE EXISTING CONCRETE PAVING
- ⑪ NOT USED
- ⑫ REMOVE EXISTING RIP-RAP, SALVAGE AND STOCKPILE FOR LATER RE-USE
- ⑬ REMOVE EXISTING DEAD END SIGN, DELIVER TO OWNER
- ⑭ REMOVE AND SALVAGE OFF SITE APPROXIMATELY 114 LF OF EXISTING END FLARE, POSTS, AND GUARDRAIL AS NEEDED TO RECONSTRUCT. VERIFY LIMITS IN FIELD PRIOR TO REMOVAL WITH OWNERS REPRESENTATIVE.
- ⑮ SAWCUT
- ⑯ REMOVE EXISTING MAIL BOX AND DELIVER TO OWNER
- ⑰ CUT AND CAP EXISTING MAINLINE, SALVAGE EXISTING IRRIGATION VALVE, AND DELIVER TO OWNER.
- ⑱ REMOVE EXISTING GATE AND DISPOSE OF OFF-SITE.



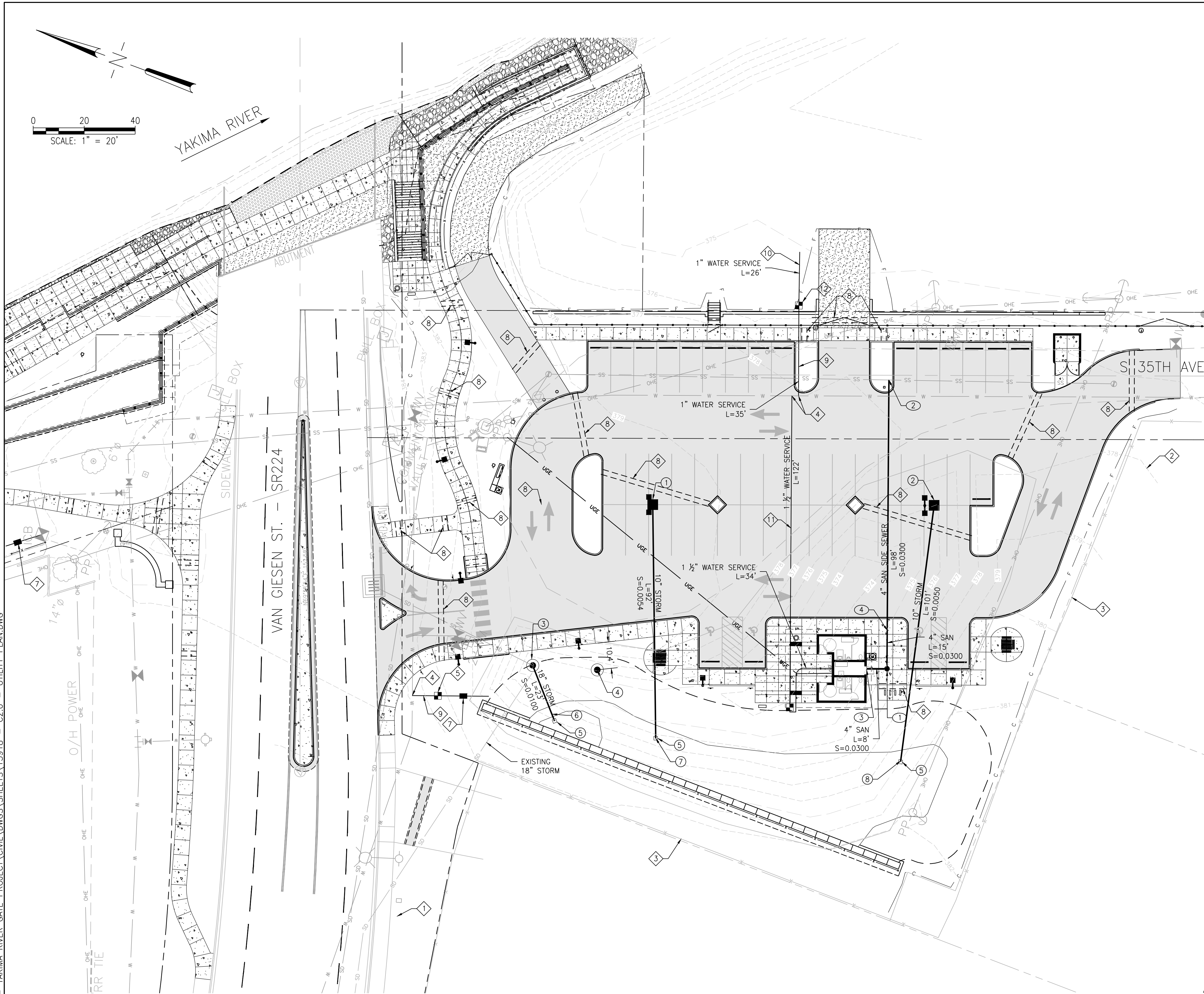
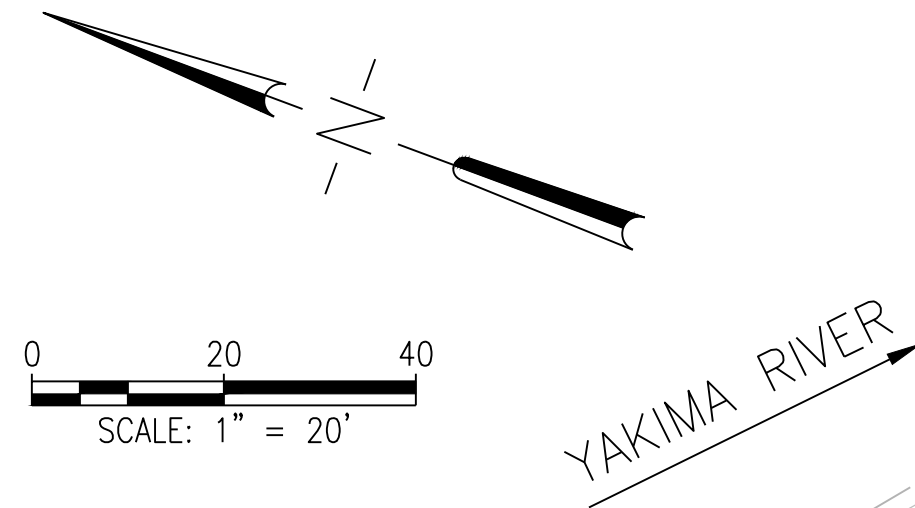
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**GENERAL NOTES**

1. FINISH GRADE CONTOURS OMITTED FOR CLARITY.
2. SEE LAYOUT PLAN FOR ADDITIONAL DIMENSIONS
3. SEE IRRIGATION PLAN FOR IRRIGATION SLEEVES. SLEEVES SHALL BE INSTALLED PRIOR TO PAVING.

**KEY NOTES/WATER NOTES/IRRIGATION**

- 1 RIGHT-OF-WAY / PROPERTY LINES
- 2 EXISTING GROUND CONTOURS
- 3 EXISTING FENCE, PRESERVE AND PROTECT
- 4 CONNECT TO EXISTING WATER MAIN PER CITY OF WEST RICHLAND STANDARD DETAIL 4-26B. CONTRACTOR TO DIG AND VERIFY MAIN SIZE AND MATERIAL PRIOR TO CONSTRUCTION.
- 5 1 1/2" METER SETTER AND METER BOX PER CITY OF WEST RICHLAND STANDARD DETAIL 4-26A
- 6 PROVIDE BURIED POWER TO RESTROOM FROM POLE MOUNTED TRANSFORMER. COORDINATE WITH BENTON REA.
- 7 1 1/2" DCVA PER CITY OF WEST RICHLAND STANDARD DETAIL 4-13
- 8 IRRIGATION SLEEVE, SEE IRRIGATION PLAN
- 9 1" WATER SERVICE, SEE CITY OF WEST RICHLAND STANDARD DETAIL 4-26A
- 10 1" WATER SERVICE, CONNECT TO EXISTING RESIDENCE WATER SERVICE, COORDINATE SERVICE INTERRUPTION WITH CITY WATER CREW
- 11 1 1/2" WATER SERVICE, SEE CITY OF WEST RICHLAND STANDARD DETAIL 4-26

**SANITARY SEWER NOTES**

- 1 CLEANOUT #1  
RIM 380.09  
IE 374.76 (4")
- 2 CONNECT TO EXISTING SANITARY MAIN PER COWR STD. DETAIL 3-6B  
IE 371.37 (4")  
IE 365.55 (SEWER MAIN)  
CONTRACTOR TO DIG AND VERIFY
- 3 CONNECT TO BUILDING  
IE 375.00 (4")
- 4 CLEANOUT #2  
RIM 379.96  
IE 374.31 (4")

**STORM SYSTEM NOTES**

- 1 CATCH BASIN #1  
RIM 378.00  
IE 375.50 OUT (W)
- 2 CATCH BASIN #2  
RIM 378.00  
IE 375.50 OUT (W)
- 3 WSDOT TYPE 2 CATCH BASIN, 72" DIAMETER WITH MANHOLE RING AND COVER, CUT EXISTING STORM AND CONNECT TO STORM  
RIM 380.00  
IE 12" IN 374.60 (N) EXISTING CONC.  
IE 18" IN 374.60 (W) EXISTING CONC.  
IE 18" OUT 374.60 (SW)
- 4 MODIFIED DRYWELL WITH BEEHIVE INLET PER COWR STD. DETAIL 5-4B WITH CATCH BASIN FRAME AND GRATE PER COWR STD. DETAIL 5-2  
RIM 379.00
- 5 WSDOT HEADWALL FOR CULVERT PIPE AND UNDERPASS, SEE WSDOT STANDARD PLAN B-75.20-01, FULL MITERED.
- 6 POND OUTLET, 18"  
IE 374.37
- 7 POND INLET, 10"  
IE 375.00
- 8 POND INLET, 10"  
IE 375.00

CALL  
2 BUSINESS DAYS  
BEFORE YOU DIG  
811  
"It's the Law"  
BENTON COUNTY UTILITIES COORDINATING COUNCIL

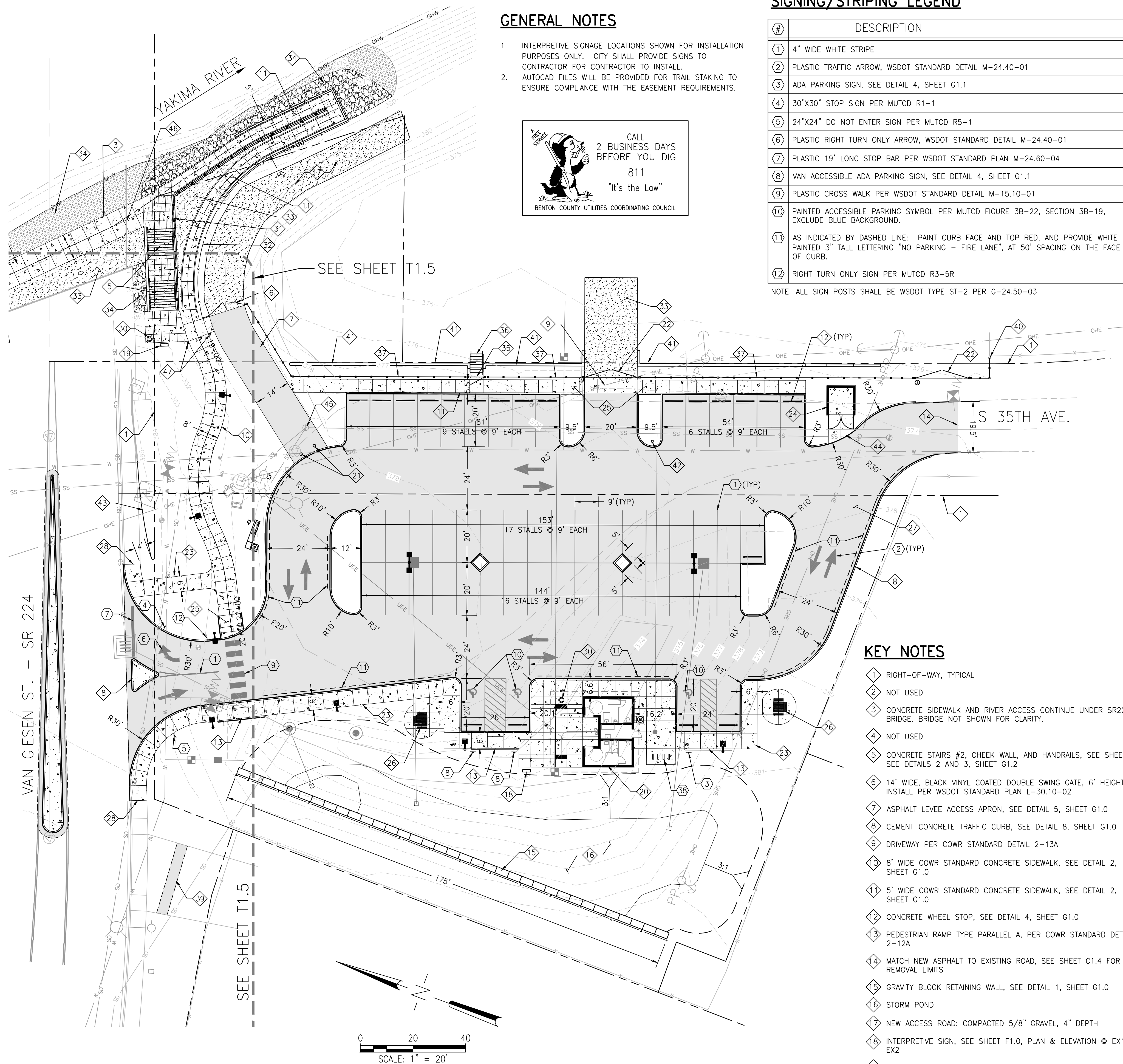
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**GENERAL NOTES**

1. INTERPRETIVE SIGNAGE LOCATIONS SHOWN FOR INSTALLATION PURPOSES ONLY. CITY SHALL PROVIDE SIGNS TO CONTRACTOR FOR CONTRACTOR TO INSTALL.
2. AUTOCAD FILES WILL BE PROVIDED FOR TRAIL STAKING TO ENSURE COMPLIANCE WITH THE EASEMENT REQUIREMENTS.



**SIGNING/STRIPING LEGEND**

#	DESCRIPTION
1	4" WIDE WHITE STRIPE
2	PLASTIC TRAFFIC ARROW, WSDOT STANDARD DETAIL M-24.40-01
3	ADA PARKING SIGN, SEE DETAIL 4, SHEET G1.1
4	30"x30" STOP SIGN PER MUTCD R1-1
5	24"x24" DO NOT ENTER SIGN PER MUTCD R5-1
6	PLASTIC RIGHT TURN ONLY ARROW, WSDOT STANDARD DETAIL M-24.40-01
7	PLASTIC 19' LONG STOP BAR PER WSDOT STANDARD PLAN M-24.60-04
8	VAN ACCESSIBLE ADA PARKING SIGN, SEE DETAIL 4, SHEET G1.1
9	PLASTIC CROSS WALK PER WSDOT STANDARD DETAIL M-15.10-01
10	PAINTED ACCESSIBLE PARKING SYMBOL PER MUTCD FIGURE 3B-22, SECTION 3B-19, EXCLUDE BLUE BACKGROUND.
11	AS INDICATED BY DASHED LINE: PAINT CURB FACE AND TOP RED, AND PROVIDE WHITE PAINTED 3" TALL LETTERING "NO PARKING - FIRE LANE", AT 50' SPACING ON THE FACE OF CURB.
12	RIGHT TURN ONLY SIGN PER MUTCD R3-5R

NOTE: ALL SIGN POSTS SHALL BE WSDOT TYPE ST-2 PER G-24.50-03

- 20 RESTROOM, SEE ARCHITECTURAL PLANS
- 21 REMOVABLE BOLLARD  
MODEL: B-3 6" DECORATIVE STEEL BOLLARD  
MANUFACTURER: FAIR WEATHER SF & ACCESSORIES, 1-360-895-2626  
COLOR: BLUE, POWDER COATED, WITH CORROSION RESISTANT UNDERCOAT. HOT DIP GALVANIZING ON RECEIVER  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE. EMBED MOUNT PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 22 20' WIDE DOUBLE SWING GATE, 6' HEIGHT  
MODEL: SANIBEL, OR APPROVED EQUAL  
MANUFACTURER: MIGHTY MULE E-Z GATE SYSTEMS, 1-850-575-0176  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE. INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 23 6' WIDE CONCRETE SIDEWALK, SEE DETAIL 2, SHEET G1.0
- 24 TRASH ENCLOSURE, SEE ARCHITECTURAL DRAWINGS
- 25 ADA SIDEWALK RAMP TYPE PERPENDICULAR B, PER COWR STANDARD DETAIL 2-12D
- 26 PICNIC TABLE  
MODEL: CRPR-3  
MANUFACTURER: VICTOR STANLEY, 1-855-8300  
COLOR: BLACK, POWDER COATED  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE. IN-GROUND MOUNT, INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN. SEE DETAIL 3, SHEET G1.0 FOR THICKENED CONCRETE MOUNTING PAD.
- 27 PARKING LOT PAVEMENT SECTION PER DETAIL 4, G1.0
- 28 MATCH EXISTING SIDEWALK AT BRIDGE ABUTMENT, SEE SHEET C1.4 FOR LIMITS OF REMOVAL
- 29 NOT USED
- 30 TRASH RECEPTACLE  
MODEL: FC-12 CONCOURSE SERIES 36-GALLON LITTER RECEPTACLE WITH FC-12 COMPONENTS  
MANUFACTURER: VICTOR STANLEY, 1-301-855-8300  
COLOR: BLACK  
BLACK PLASTIC LINER, S-2B DOME LID (BLACK)  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE. SURFACE MOUNT, INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN. SEE DETAIL 3, SHEET G1.0 FOR THICKENED CONCRETE MOUNTING PAD.
- 31 CABLE GUARDRAIL, SEE SHEET G1.6
- 32 6' TALL BLACK VINYL COATED CHAIN LINK FENCE WITH TOP RAIL  
INSTALL PER WSDOT STANDARD DETAIL FS-2, TYPE 1 CHAIN LINK FENCE WITH TOP RAIL.
- 33 COMPACTED 5/8" GRAVEL, 4" DEPTH
- 34 PLACE SALVAGED RIPRAP, 24" DEPTH MIN.
- 35 6' WIDE SINGLE SWING GATE, 6' HEIGHT  
MODEL: SANIBEL, OR APPROVED EQUAL  
MANUFACTURER: MIGHTY MULE E-Z GATE SYSTEMS, 1-850-575-0176  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE. INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 36 CONCRETE STAIRS WITH HANDRAILS, SEE DETAIL 5 ON SHEET G1.2
- 37 DECORATIVE ROCK FENCE, 6' HEIGHT  
MODEL: ECO-STONE, OR APPROVED EQUAL  
MANUFACTURER: SIMTEK FENCE, 1-801-655-5236  
COLOR: GRAY  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE. INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 38 BIKE RACK  
MODEL: BRBS-103 CYCLE SENTRY SERIES BIKE RACK WITH TUBULAR STEEL RING  
MANUFACTURER: VICTOR STANLEY, 1-855-8300  
COLOR: BLACK  
POWDER COAT OVER GALVANIZED FINISH.  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE. EMBED MOUNT, INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 39 PATCH PAVEMENT (FOR IRRIGATION SLEEVE) PER COWR STANDARD DETAIL 2-8
- 40 MAX. 6" GAP BETWEEN DECORATIVE ROCK FENCE AND ADJACENT EXISTING FENCE
- 41 SEGMENTED BLOCK WALL  
KEYSTONE STRAIGHT FACED GARDEN WALL  
MANUFACTURER: KEYSTONE RETAINING WALL SYSTEMS, LLC  
COLOR: GREY  
INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 42 LOCKABLE MAILBOX: OWNER FURNISHED, CONTRACTOR INSTALLED
- 43 INSTALL SALVAGED VEHICULAR GUARDRAIL PER WSDOT DETAILS. BEGIN FLARED TERMINAL AT NEAREST EXISTING POST. INSTALL 37'-6" LENGTH FLARED TERMINAL PER WSDOT STANDARD DETAIL C-4B. CONNECT TO EXISTING GUARDRAILS.
- 44 DEPRESSED CURB
- 45 ADJUST EXISTING MANHOLE TO GRADE PER COWR STD DETAIL 3-4
- 46 "LOW CLEARANCE" SIGN LOCATION: INSTALL ON FACE OF BRIDGE ABOVE TRAIL. OWNER FURNISHED, CONTRACTOR INSTALLED.
- 47 (2) BOLLARD: FAIRWEATHER MODEL B-3 W/ EYEBOLT

**KEY NOTES**

- 1 RIGHT-OF-WAY, TYPICAL
- 2 NOT USED
- 3 CONCRETE SIDEWALK AND RIVER ACCESS CONTINUE UNDER SR224 BRIDGE. BRIDGE NOT SHOWN FOR CLARITY.
- 4 NOT USED
- 5 CONCRETE STAIRS #2, CHEEK WALL, AND HANDRAILS, SEE SHEET SEE DETAILS 2 AND 3, SHEET G1.2
- 6 14' WIDE, BLACK VINYL COATED DOUBLE SWING GATE, 6' HEIGHT  
INSTALL PER WSDOT STANDARD PLAN L-30.10-02
- 7 ASPHALT LEVEE ACCESS APRON, SEE DETAIL 5, SHEET G1.0
- 8 CEMENT CONCRETE TRAFFIC CURB, SEE DETAIL 8, SHEET G1.0
- 9 DRIVEWAY PER COWR STANDARD DETAIL 2-13A
- 10 8' WIDE COWR STANDARD CONCRETE SIDEWALK, SEE DETAIL 2, SHEET G1.0
- 11 5' WIDE COWR STANDARD CONCRETE SIDEWALK, SEE DETAIL 2, SHEET G1.0
- 12 CONCRETE WHEEL STOP, SEE DETAIL 4, SHEET G1.0
- 13 PEDESTRIAN RAMP TYPE PARALLEL A, PER COWR STANDARD DETAIL 2-12A
- 14 MATCH NEW ASPHALT TO EXISTING ROAD, SEE SHEET C1.4 FOR REMOVAL LIMITS
- 15 GRAVITY BLOCK RETAINING WALL, SEE DETAIL 1, SHEET G1.0
- 16 STORM POND
- 17 NEW ACCESS ROAD: COMPACTED 5/8" GRAVEL, 4" DEPTH
- 18 INTERPRETIVE SIGN, SEE SHEET F1.0, PLAN & ELEVATION @ EX1 & EX2
- 19 INTERPRETIVE SIGN, SEE SHEET F1.0, PLAN & ELEVATION @ EX1 & EX2

**MacKay Sposito**  
ENERGY PUBLIC WORKS LAND DEVELOPMENT  
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WEST RICHLAND, WASHINGTON

**TRAILHEAD LAYOUT AND MATERIALS PLAN**

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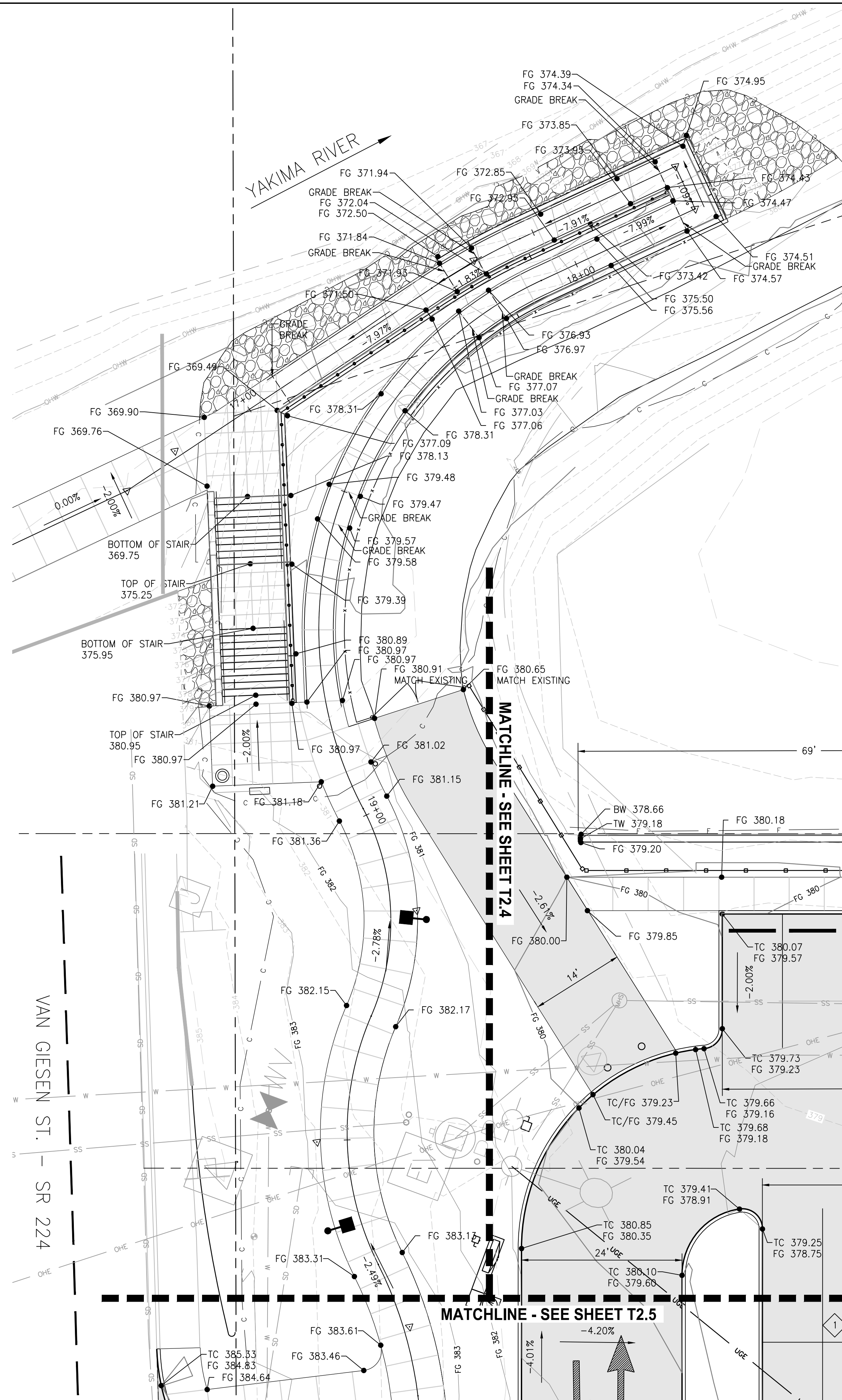
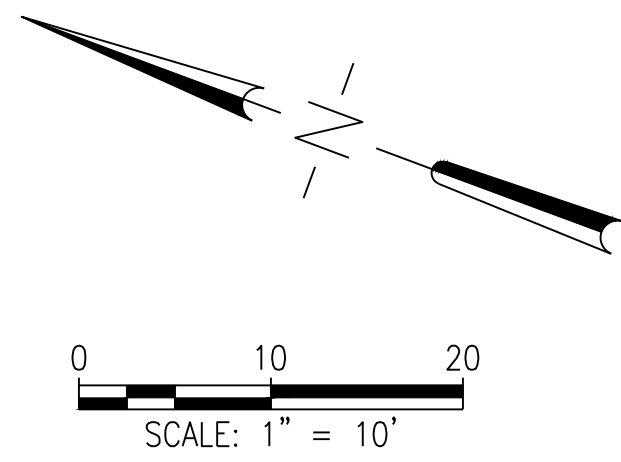
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**GENERAL NOTES**

1. SEE TRAIL LAYOUT AND MATERIALS PLAN FOR ADDITIONAL DIMENSIONS.
2. SEE SHEET 3.3 FOR ADDITIONAL WALL, FOOTING, AND WALL DRAIN INFORMATION.

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YAKIMA RIVER GATEWAY  
WEST RICHLAND, WASHINGTON  
GRADING & LAYOUT ENLARGEMENTS

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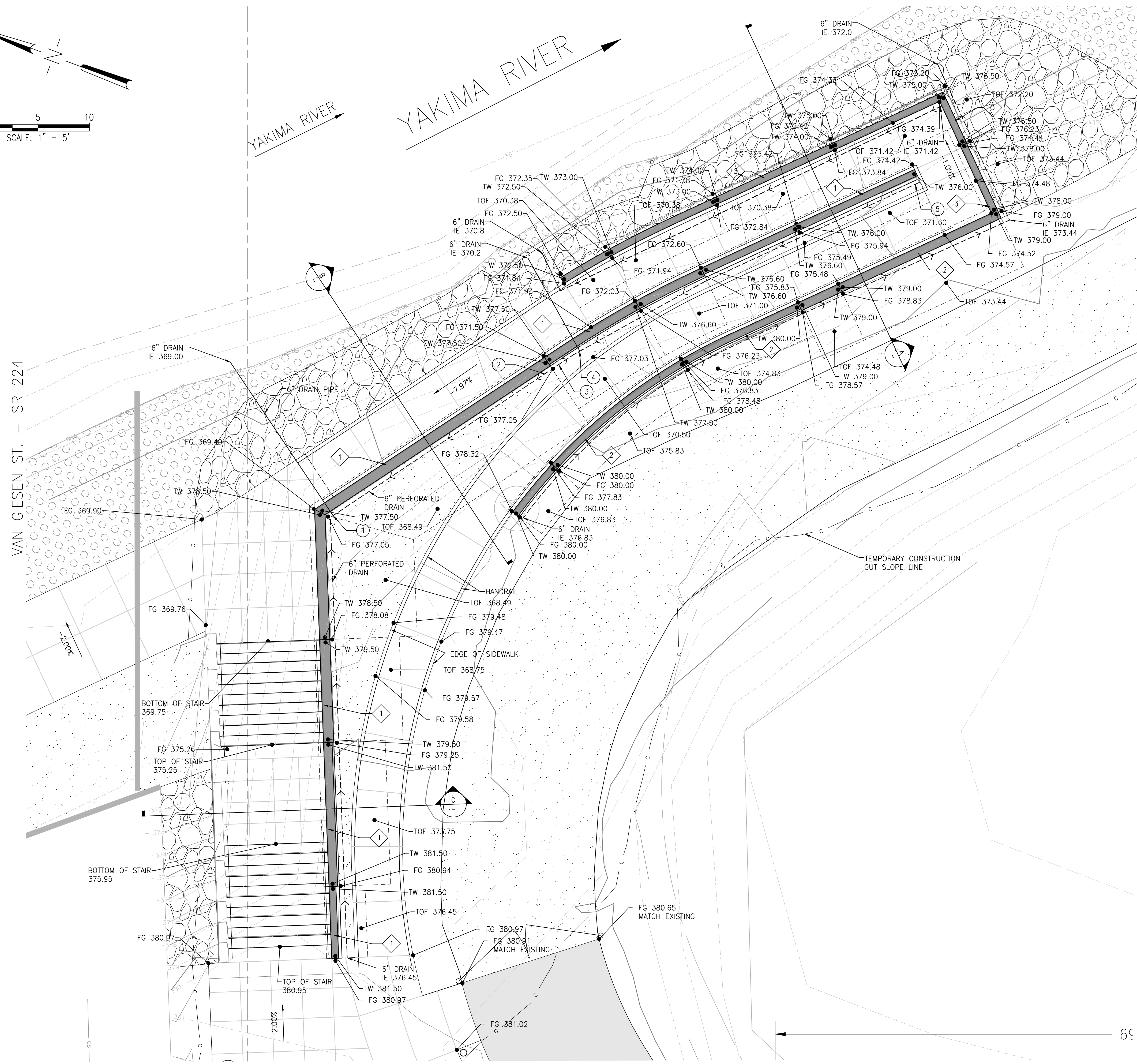
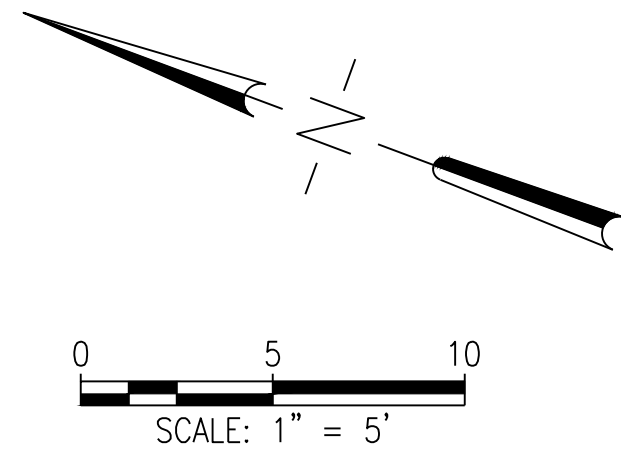
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NO. 23 OF 52





**KEY NOTES**

- ① 12" THICK FLOOD WALL
- ② 10" THICK FLOOD WALL
- ③ 8" THICK FLOOD WALL

**STORM NOTES**

- ① 6" WALL DRAIN TEE  
I.E. 369.10
- ② 6" WALL DRAIN  
I.E. 364.10
- ③ 6" WALL DRAIN  
I.E. 370.50
- ④ 6" WALL DRAIN TEE  
I.E. 370.50
- ⑤ 6" WALL DRAIN  
I.E. 371.60

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WEST RICHLAND, WASHINGTON  
**FLOOD WALL FOOTING & DRAIN  
ENLARGEMENT**

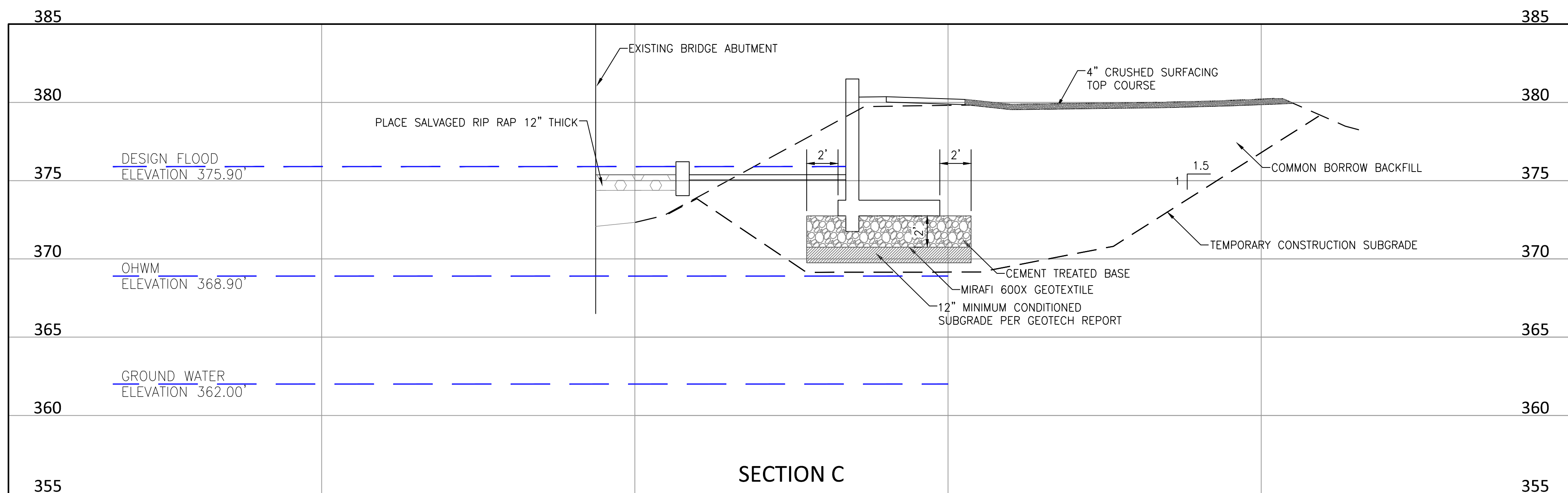
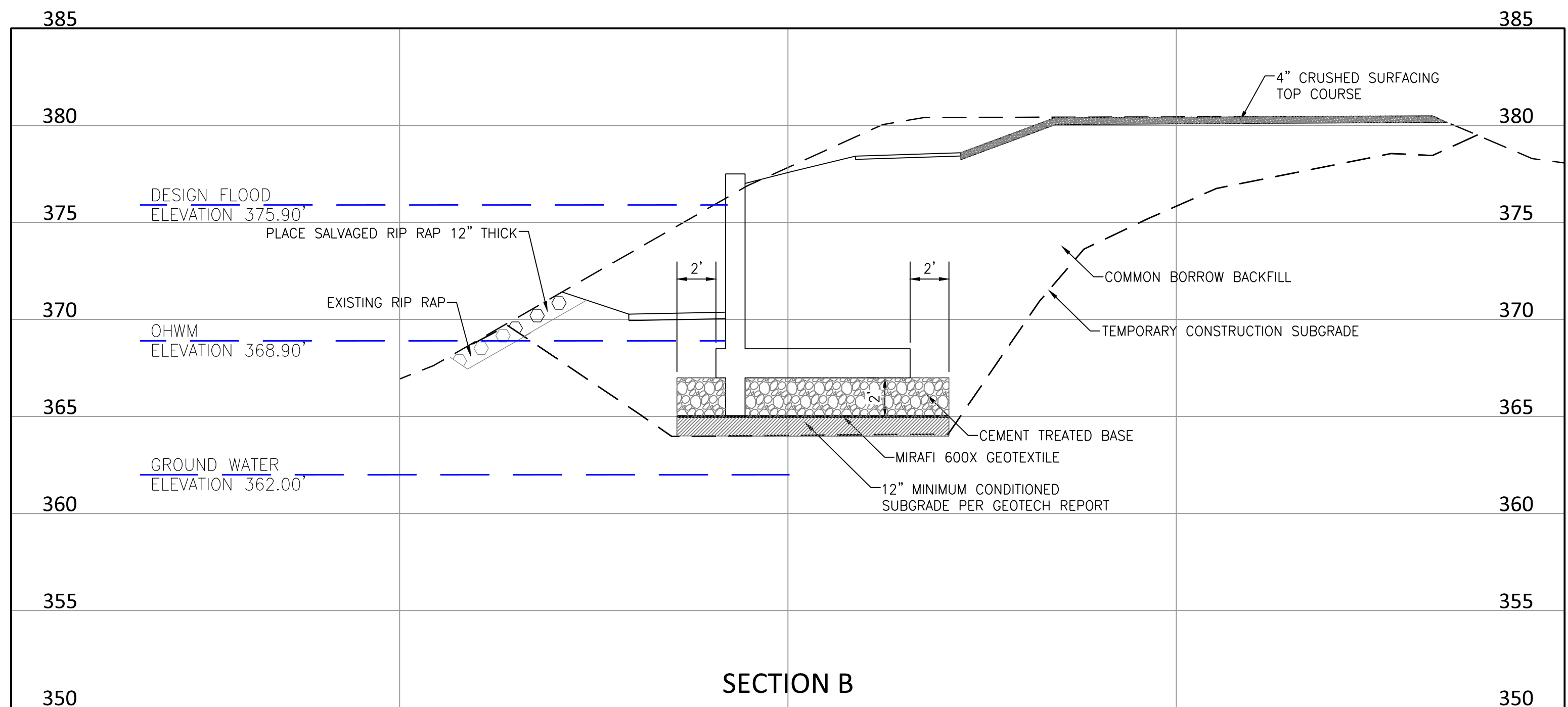
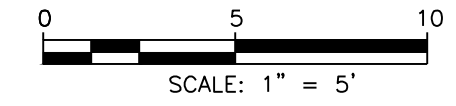
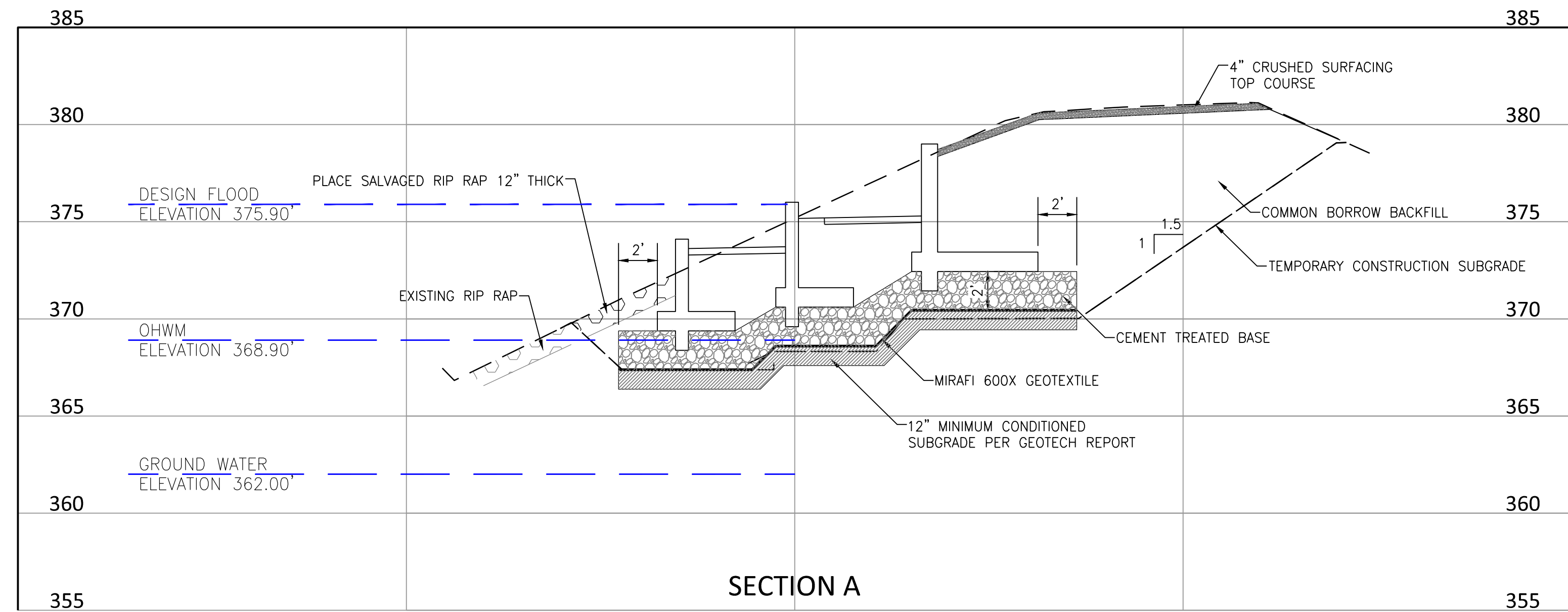
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YAKIMA RIVER GATEWAY  
 WEST RICHLAND, WASHINGTON  
 FLOOD WALL SECTIONS

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## APPENDIX B: BIOLOGICAL ASSESSMENT

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Yakima River Gateway Project  
Biological Assessment  
**Benton County, Washington**

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*Prepared for:*  
**US Army Corps of Engineers  
City of West Richland  
and  
MacKay Sposito**

*Prepared by:*  
**Anderson Environmental Consulting (AEC) LLC**

December 1, 2015

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# 1 Background

## 1.1 Location and Action Area

The project area is located within the City of West Richland, in Benton County, Washington along the west bank of the Lower Yakima River and a side channel. It is in Section 5 of Township 9 North, and Range 28 East. See Figure 1. Project Location.

The action area extends just south of the Van Giesen Bridge to just north of 38<sup>th</sup> Ave. It includes the footprint of the proposed project, the staging areas, access roads plus 100 ft. outside of these disturbance areas, which considers indirect effects of the project activities. It extends from the edge of the commercial and residential properties to the bank of the Lower Yakima River and its side channel.

## 1.2 Project Description

The City of West Richland (City) received funding from the Washington State Recreation and Conservation Office (RCO) to construct the Yakima River Gateway Project. The project will construct an approximately 1800 ft. long 10-12-ft multi-use path from just south of the Van Giesen Bridge/SR224 along the shoreline to the intersection of 38th Ave. A trailhead will be constructed south of the Van Giesen Bridge providing 52 parking spaces, a restroom, trash receptacles, and stormwater treatment. There will be an overlook and non-motorized river access near the bridge. Riprap will be placed for bank protection. The project will be compliant with the Americans with Disabilities Act (ADA) and will have additional features including lighting, interpretive signage, resting areas, entry monument signage, and passive open areas. Six trees will be removed; however, landscaping and mitigation plantings (including 400 native trees and shrubs) will be installed along the trail and along the shoreline. The project area includes City of West Richland-owned property, the SR 224 Bridge, a levee and City easements through private properties at the north end of the trail. See Appendix 1. Site Plans.

A portion of the levee was purchased by the City from the Benton County Diking District No. 1. A US Army Corps of Engineers (USACE) approval of a 33 USC 408 (Section 408) permit is required to construct a ramp and retaining wall and to connect the trailhead on the south side of the bridge to the trail north of the bridge. The project must therefore comply with the Endangered Species Act (ESA) before the Section 408 permit may be granted. This Biological Assessment is being prepared to meet the Section 7 requirements under the ESA and describes the threatened, listed, proposed species and designated critical habitats within the action area. It makes effect determinations regarding the project impacts to these species and habitats.

## 1.3 Construction Details

Project construction is anticipated to include the following:

1. Installing erosion control best management practices including but not limited to silt fencing and fiber wattles.
2. Removing six trees and smaller vegetation near the shoreline as needed to construct the non-motorized watercraft access, trail and overlook. These are primarily non-native species including black locust (*Robinia pseudoacacia*), silver maple (*Acer saccharinum*), Russian olive (*Elaeagnus angustifolia*), arbor vitae (*Thuja* sp.), and Siberian elm (*Ulmus pumila*).

3. Grading the project site as indicated in the plans in order to construct the ramp, terraced lawn, recreational trail, sidewalks, parking area, stormwater areas and the non-motorized watercraft access area.
4. Excavating and constructing the concrete retaining wall near the bridge
5. Setting forms, pouring concrete and laying asphalt for the trail, ramp, sidewalk, and overlook
6. Placing riprap along the bridge and shoreline as designed
7. Constructing the bathroom and trash receptacles
8. Pouring asphalt for the parking area and trailhead
9. Installing fencing
10. Installing irrigation system, lighting, signage, and a dumpster
11. Installing landscaping, mitigation plantings and erosion control seeding including approximately 400 native trees and shrubs.

The construction would cause noise effects due to use of excavators, backhoes trenching for utilities, concrete trucks, dump trucks, saw-cutting and use of jackhammers. Work will be completed during daytime hours and there will be no in-water work.

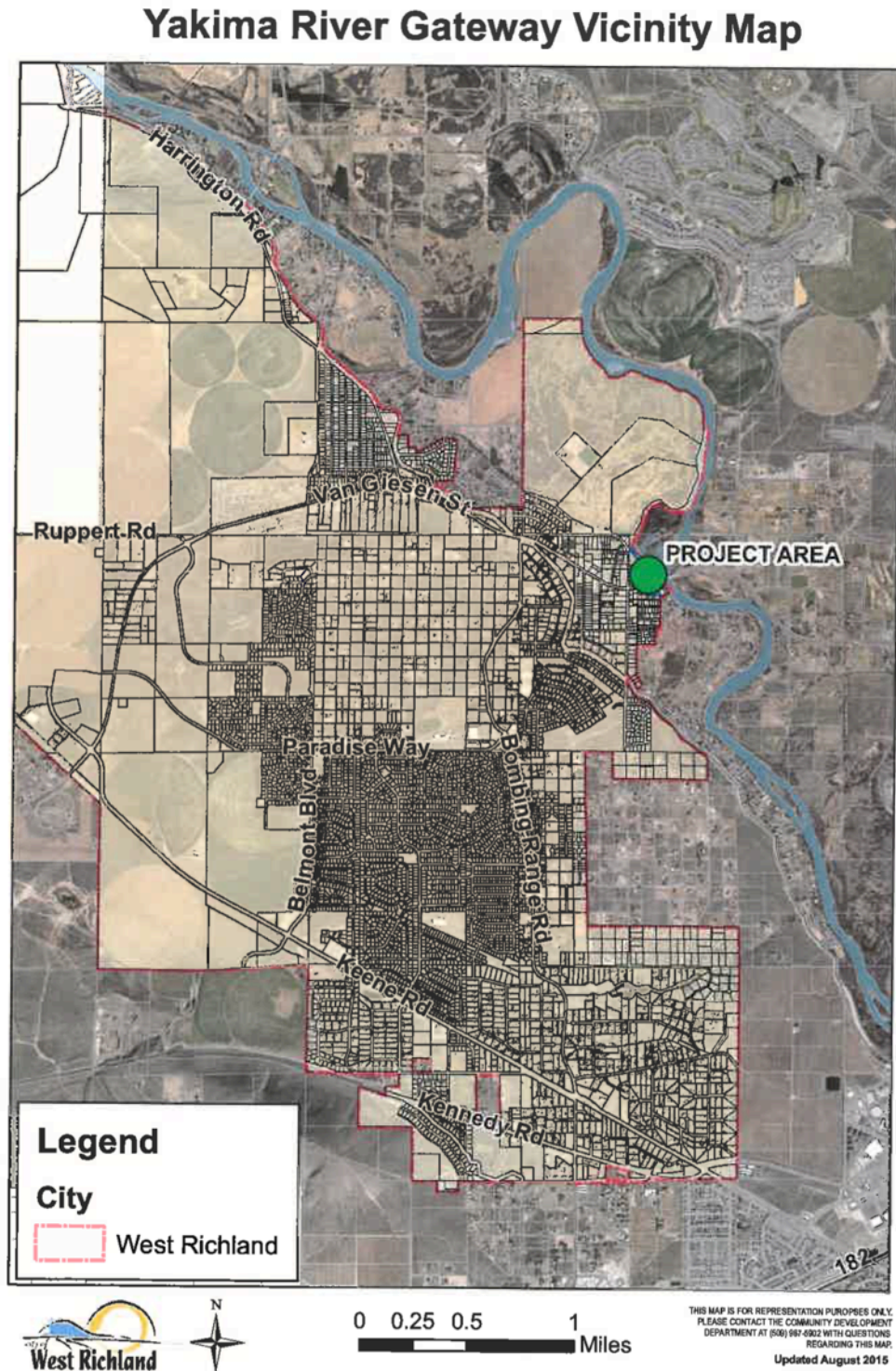
#### 1.4 Schedule

The project construction is estimated to begin in May 2016 and is estimated to be completed by November 2016 with possible extension to Spring of 2017. While there is no in-water work for this project, the WDFW in-water work window is August 1 to September 30 and is expected to apply to work immediately adjacent to the water as well. See Table 1. Construction Activity Timing for details.

**Table 1. Construction Activity Timing**

Construction Activities	Timing
Tree and vegetation removal	Between August 2 -March 14
Remove road asphalt, construct stormwater area, install utilities	June-July 2016
Construct restroom, trail, parking lot, overlook, signage, levee improvements that include the stairs and ramps, site fencing, landscape and irrigation improvements	July-October 2016
Demolition, construct non-motorized watercraft features, place riprap, excavate levee and construct concrete retaining wall	August-September 2016
Construct ramps, sidewalks, terrace, and paths	August-October 2016
Erosion control seeding, landscaping and mitigation plantings	September-October 2016
Project completed	November 2016

Figure 1. Project Location



## 2 Methodology

This Biological Assessment (BA) was prepared by Michelle Anderson, Senior Biologist from Anderson Environmental Consulting LLC. Ms. Anderson visited the site on several occasions to complete the wetland delineation report, collect baseline data of vegetation, habitat and natural and human resources, and to review the project with agency staff and design staff.

Field visits were conducted on October 31, November 1, 7, and 9 in 2014 (for wetland delineation) and on October 22, 2015. An agency field visit was held on January 21, 2015 during which the ordinary high water mark (OHWM) and the southern delineated wetland boundary were confirmed by Washington State Department of Ecology (Ecology), WDFW, the US Army Corps of Engineers (USACE), and the City.

On October 20, 2015, the official US Fish and Wildlife Service (USFWS) species (Consultation Code 01EWF00-2016-SLI-0055) and the National Marine Fisheries Service (NMFS) (NMFS 2015) lists were reviewed for listed and proposed threatened and endangered species, candidate species and proposed and designated critical habitat that may occur near the project area and/or may be affected by the proposed project. The species list fulfills the requirements under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). Ms. Anderson spoke with Greg Van Stralen with USFWS on October 28, 2015 and Justin Yeager with NMFS on October 29, 2015 to discuss species listings, occurrences and project effects.

The species and designated critical habitat that could occur in the Action Area are listed in Table 2. Federally Listed Species that May Occur in the Action Area.

**Table 2. Federally Listed Species that May Occur in the Action Area**

Species	Scientific Name	Status	Designated Critical Habitat?
<b>USFWS</b>			
<b>Yellow-billed cuckoo</b>	<i>Coccyzus americanus</i>	Threatened	Proposed
<b>Northern wormwood</b>	<i>Artemisia campestris</i> <i>var. wormskioldii</i>	Candidate	No
<b>Gray wolf</b>	<i>Canis lupus</i>	Endangered	Yes
<b>Bull trout</b>	<i>Salvelinus confluentus</i>	Threatened	Yes
<b>NMFS</b>			
<b>Middle Columbia River steelhead DPS</b>	<i>Oncorhynchus mykiss</i>	Threatened	Yes

Source: (USFWS 2015a), (NMFS 2015) and (Yeager per. comm. 2015)

## 3 Environmental Setting

The project area is in WRIA 37, the Lower Yakima River Basin and located along the western shoreline of the Lower Yakima River, a tributary to the Columbia River. A backchannel that is aligned on the west side of Fox Island is included in the project area. This reach of the Lower Yakima River is 303d listed and water quality impaired for DDT and turbidity (Ecology 2015).

The setting on the southern end of the project includes an unvegetated section of graveled levee, a paved cul-de-sac area, and a stormwater treatment area. Leading to and under the Van Giesen Bridge an



informal path is unvegetated and consists of riprap and gravel. North of the bridge is a lawn with some non-native trees along the shoreline and an increasingly steep riverbank. Further north the asphalt surfacing of Fallon Drive was removed and is now coarse gravel with fencing adjacent to residences. Continuing further north along the shoreline behind the mobile home park, the site is lawn adjacent to riparian vegetation with an adjacent wetland to the east. The project area is relatively flat with elevations ranging from 350-ft to 380-ft above sea level.

Vegetation in the action area includes silver maple, cottonwood, red osier dogwood, Siberian elm, reed canarygrass, black locust, upland weeds, Canada bluegrass, lawn and other non-native species. There are no stands of native bunchgrasses or other types of native vegetation. See Photos in Appendix A, Photos.

### **3.1 USFWS Species**

#### **3.1.1 Yellow-billed cuckoo**

The yellow-billed cuckoo was federally listed as threatened on October 3, 2014. Critical habitat was proposed for designation on August 15, 2014 but excluded Washington State. (USFWS 2015a).

Yellow-billed cuckoo require large, treed riparian corridors with dense, low scrubby vegetation. Nests are often placed in willows along streams and rivers, with nearby cottonwoods serving as foraging sites. (USFWS 2015a). Nesting pairs require large blocks of riparian habitat, which do not occur in the project area.

In winter, yellow-billed cuckoos can be found in tropical habitats with similar structure, such as scrub forest and mangroves. Individuals may be on breeding grounds between May and August. In the Pacific Northwest, the species was formerly fairly common in willow bottoms along Willamette and Columbia Rivers in Oregon, and in the Puget Sound lowlands and along the lower Columbia River in Washington. The species was also found in southeast British Columbia, but the available data are not adequate to determine historic abundance. The species was rare east of the Cascade Mountains in these States and provinces. There are no known occurrences near the project. Transients have been documented in LaGrande, Washington and Moscow, Idaho. (Ebird 2015). The nearest known occurrences are nesting populations west of Boise, Idaho along the Boise River to the confluence of the Snake River (USACE 2015). There are also known populations along the Big Wood River in southeast Idaho. Yellow-billed cuckoo is believed to be extirpated from Washington. (USFWS 2015a; Van Stralen per comm. 2015).

Their primary food sources are caterpillars and are often supplemented with beetles, ants, spiders, crickets, frogs and lizards. In the summer, fall, and winter they may also forage small wild fruits including elderberries and blackberries. (USFWS 2015a)

In the west, much of its habitat has been converted to farming and housing leading to their possible extirpation from Washington and other areas. There have been no documented occurrences and no known sightings of yellow-billed cuckoo in the action area and there is not suitable understory.

There are no known occurrences of yellow-billed cuckoo near the project and the nearest known breeding population is in southeast Idaho, therefore it is determined **the project will have no effect to yellow-billed cuckoo.**

### **3.1.2 Northern wormwood**

Northern wormwood became a candidate for federal listing in October 1999. It is a perennial plant in the aster family (Asteraceae). Also commonly known as Pacific sagebrush, it is generally a low-growing plant, 15 to 30 centimeters tall, but may grow up to 40 centimeters in height. This plant has a taproot and basal leaves crowded in rosettes. The basal leaves are 2 to 10 cm (1 to 4 in) long and divided two or three times in mostly linear divisions. Leaves on the upper stems are similar, but smaller and less divided. The stems and leaves are conspicuously covered with silky hairs. The fruits (achenes) and the enlarged upper ends of the flower-bearing stalks (receptacles) are without hairs. Northern wormwood is the only variety of *Artemisia* that flowers in April and May. (USFWS 2015c).

Historically, northern wormwood was collected along the banks of the Columbia River near the mouth of the John Day River in Wasco County, Oregon to the vicinity of Hood River in Hood River County, Oregon. These sites have been resurveyed for this species and no populations were found. It is likely that disturbances due to the construction of several dams and subsequent flooding of habitat resulted in the extirpation of historical occurrences. Currently, this plant is known to occur in only two sites along the Columbia River, in Klickitat and Grant Counties, Washington. These two populations were discovered in 1983.

The action area is predominantly disturbed and developed areas with little or no native upland habitats consisting of Siberian elm, silver maple, reed canarygrass, Kentucky bluegrass, and upland weeds. There is no suitable habitat for this species, no associated plants and no nearby occurrences of the plant, therefore, **the project will have no effect on the northern wormwood.**

### **3.1.3 Gray wolf**

Gray wolves were first listed as endangered on January 1, 1974. The Northern Rocky Mountains (NRM) population of gray wolf was identified as a Distinct Population Segment (DPS). In Washington, the NRM DPS includes that portion of Washington east of the centerline of Highway 97 and Highway 17 north of Mesa and that portion of Washington east of the centerline of Highway 395 south of Mesa (USFWS 2011). In Oregon and Washington, gray wolves that occur outside of the boundaries of this DPS remain federally listed as endangered. The action area is west of Highway 395 and is outside of the NRM DPS boundary and is therefore, federally listed as Endangered (USFWS 2013).

Gray wolves were once common throughout much of Washington. Currently, wolf packs and individuals have been confirmed in the Selkirk Mountains of northeastern Washington and in the northern Cascade Mountains (WDFW 2009). Wolves have also been reported in the Blue Mountains of southeast Washington and northeast Oregon. There have been no packs south of Kennewick and reports of wolves in Yakima have not been verified (Van Stralen per. comm, 2015).

The project is in a highly altered urban environment in the City of West Richland and wolves are not known to occur in the action area; therefore, **the project will have no effect to gray wolves or their habitat.**

### **3.1.4 Bull trout**

Bull trout were originally listed as threatened on July 10, 1998. Critical habitat for Bull trout was listed on September 30, 2010 and includes the Lower Yakima River (USFWS 2010b). The Yakima Basin is listed as part of the Columbia River Distinct Population Segment (DPS) and was one of the 34 Core areas within the larger Middle Columbia Recovery Unit and all recovery units within the DPS.

The Yakima bull trout exhibit four distinct life history patterns: anadromous, adfluvial, fluvial, and resident. Anadromous populations spend the early portion of their life in streams, grow to adulthood in the ocean, and eventually return to the tributaries in which they were born to spawn. Adfluvial populations spend between one and four years growing in their natal stream and then migrate to lakes to mature. Fluvial populations reside in larger streams and rivers then migrate after a few years to their natal stream to spawn. Resident bull trout spend their entire lives in or near the stream where they hatched.

Bull trout require cold temperatures, abundant cover in the form of large wood, undercut banks and boulders, clean substrate for spawning, interstitial space large enough to conceal juvenile bull trout, migratory corridors with minimal physical, biological or water quality impediments and stable channels (Shellburg 2002, USFWS 2005a).

While bull trout have access to, and have been historically documented in the lower Yakima River, fragmentation of habitat has resulted in a restricted distribution and their occurrence in the Lower Yakima River is now rare even under good conditions. The Lower Yakima River, within the action area is a moderate to slow moving river with an unvegetated levee on the southern end of the project but dense cover along the side channel further north. This reach has predominantly silty loam substrates. Temperatures have been recorded to be up to 77°F during the summer low flow periods (August). (DOE 2015). This reach is also water quality limited and 303(d) listed for DDT and turbidity. The reach has low existing/potential large woody debris. These conditions provide a less than ideal habitat for aquatic resources.

Bull trout are most likely to occupy the Lower Yakima River during winter months, and in very low numbers (Anglin et al. 2010; Van Stralen 2015 per. comm). They spawn during September and October and should be out of the main channels and in the smaller, higher elevation tributaries such as the Naches by the end of October.

There is no in-water work but six non-native trees will be removed near the shoreline which will reduce shade and affect soil stabilization; however, the trees will be replaced with approximately 400 native trees and shrubs that will be planted along the trail and the shoreline. Work adjacent to the water is likely to occur during low flow periods between August and September when bull trout are not likely to be present; therefore, the **project will have no effect to bull trout and their designated critical habitat.**

There will also be landscaping and lawn all along the path and trail facilities. Runoff from the project will be treated in stormwater treatment areas more than 150 ft. from the river and runoff from the trail will be directed upland. In addition, a stormwater pollution prevention plan (SWPP) will be developed prescribing best management practices that will minimize erosion and sedimentation. The BMPs may include silt fencing, fiber wattles, and erosion control seeding. There will be no high decibel construction activities such as pile driving and no in-water work as a part of this project. Bull trout are not expected to occur in the project area due to the poor habitat and poor water quality.

**The project will have no effect to bull trout and its designated critical habitat** due to the following:

- Adults and juveniles are not expected to be present in the action area during the in-water work window, which is during the low flow period.
- There is no spawning in the action area.
- Water temperatures in the action area during construction will be too high to support bull trout.

- There will be no in-water work.
- The six trees that will be removed are non-native and will be replaced with approximately 400 native trees and shrubs. Landscaping will also provide soil stabilization and may provide limited habitat.
- There will be no blasting, saw cutting, pile driving or other loud or vibratory impacts.
- A SWPPP and the implemented BMPs including silt fencing, fiber wattles and erosion control seeding will minimize potential impacts due to erosion and sedimentation.

### **3.2 NOAA Listed Species**

The only listed NOAA species that may occur in the action area is the Middle Columbia River Steelhead DPS and its designated critical habitat (Yeager, 2015 per. comm.).

#### **3.2.1 Middle Columbia River Steelhead DPS**

The Middle Columbia River DPS of steelhead is federally listed as threatened. Critical habitat for the Middle Columbia River DPS of steelhead was designated in the action area. (NOAA Fisheries 2015). All Yakima Basin Steelhead are classified as summer steelhead (YBFWRB 2008).

Steelhead prefer deep, cool waters high in dissolved oxygen (DO) with large substrate and riffle habitat. Early life stages are susceptible to low oxygen conditions, reductions in river flow, high water temperatures and loss of stream cover (Wydoski and Whitney 2003).

Steelhead within the action area are either rearing in the slower portions of the river or migrating through the area to spawning areas in smaller tributaries. Adult steelhead may be migrating upstream through the area to spawn in Corral Creek where gravel patches occur with suitable substrate size (YBFWRB 2008). They are not expected to be present in the action area in the warmest months during the in-water work window and when work closest to the river is expected to occur (Yeager, per. comm). This reach and side channels are used for rearing by juveniles which are expected to be present year-round but are not expected to be abundant due to the high temperatures during August and September in this reach. They are more likely to be holding in the slower areas of the river such as the side channels and backwater areas further north.

**The project may affect but is not likely to adversely affect Middle Columbia Steelhead and its designated critical habitat** due to the following:

- There will be no in-water work that could cause water quality impacts.
- There is no spawning in the action area.
- Adults that are migrating through the area are not expected to be present during the in-water work window, which is during the low flow period.
- Juveniles may be present year-round in the action area but would not likely to be abundant due to the high temperatures expected during August and September in this reach.
- The six trees that will be removed are non-native; however, they provide shade, which contributes to lower water temperatures necessary for the species. The trees are also a future source of woody debris, which is needed for stream and habitat diversity and supports insects that are a food source for the fish. Insect larvae on leaves may fall into the water providing a food source for the fish species. The tree removal could also result in a temporal loss of refugia and organic material within the aquatic habitat.

- The removed trees will be replaced with approximately 400 native trees and shrubs that will be planted immediately adjacent to the shoreline and within the park including areas that are currently unvegetated. This will provide a future source of riparian habitat for shade, greater species diversity, soil stabilization, and large woody debris recruitment for future stream diversity and food sources.
- There will be no blasting, saw cutting, pile driving or other loud or vibratory impacts.
- A SWPPP and the implemented BMPs including silt fencing, fiber wattles and erosion control seeding will minimize potential impacts to water quality due to erosion and sedimentation.
- A stormwater pond will be located outside of the riparian area and will capture and treat stormwater along the road and parking lot, which will minimize water quantity and water quality impacts.

## 4 Magnuson-Stevens Fishery Conservation and Management Act of 1976, as Amended

The consultation requirement of section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) directs Federal agencies to consult with NMFS on all actions, or proposed actions that may adversely affect Essential Fish Habitat (EFH). Adverse effects include the direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside EFH, and may include site-specific or EFH-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

The Pacific Fishery Management Council (PFMC) designated EFH for Chinook salmon, Coho salmon, and Puget Sound pink salmon (PFMC 1999). This Hydrologic Unit Code (HUC) has been identified as currently accessible EFH for Chinook and Coho salmon habitat. However, they are hatchery species. The discussion of steelhead trout above is applicable to the analysis of habitat, effects for the Chinook and Coho salmon that occur in this area. Because there will be no in-water work, no loud vibratory impacts to the water, and adults are not expected to be present during construction and because any trees removed will be replaced with native species, **there will be no effects to Chinook or Coho as described in the analysis of fish habitat above, the proposed project is not likely to adversely affect EFH.**

## 5 Fish and Wildlife Coordination Act of 1958, As Amended

The Fish and Wildlife Coordination Act (FWCA) authorizes the USFWS to evaluate the impacts to fish and wildlife species from proposed Federal water resource development projects that could result in the control or modification of a natural stream or body of water that might have effects on the fish and wildlife resources that depend on that body of water or its associated habitats. **This proposed action does not involve activities subject to the FWCA.**

## 6 Migratory Bird Treaty Act of 1918, As Amended

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. §§ 703-712, as amended) prohibits the taking of and commerce in migratory birds (live or dead), any parts of migratory birds, their feathers, or nests. Take is

defined in the MBTA to include by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing or transporting any migratory bird, nest, egg, or part thereof.

A wide variety of species listed under the MBTA occur on Corps managed lands. Ducks, geese, and mourning doves can be expected to nest in the project area and use the area as a wintering and resting area during migration. A variety of non-game birds also inhabit the area. The project area is dominated by gravels, riprap, cultivated lawn, and non-native and native trees and shrubs and may attract a limited number of migratory nesting birds. The tree removal will occur during the non-nesting periods between August 2 and March 14. If tree or vegetation removal or potential nesting habitat is determined to be necessary outside of that time period, (March 15 to August 1) a qualified migratory bird monitor will perform a breeding bird survey of the site. Any active nests will be avoided (50 foot diameter buffer) until no longer active. Because the trees will be replaced, and because the trees will be removed during non-nesting periods, **the proposed action will not result in taking migratory birds, their nests, eggs, or parts thereof.**

## 7 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions, primarily for Native American Tribes. Take under the BGEPA includes both direct taking of individuals and take due to disturbance. Disturbance is further defined on 50 CFR 22.3.

Throughout most of the western United States golden eagles are mostly year-long residents (Polite and Pratt 1999), breeding from late January through August with peak activity in March through July (Polite and Pratt 1999). They may also move down-slope for winter or upslope after the breeding season (Polite and Pratt 1999; Technology Associates 2009).

There are no known eagle nests or territories in this section of the Lower Yakima River. (Ritter 2015). Golden eagles prefer cliff faces and bald eagles prefer large trees along riparian areas. While there are large trees within the project area and there is suitable habitat for bald eagles near the project area, and the area could be used for wintering, the closest known nest, confirmed by WDFW, is approximately 4.4 miles southeast near the confluence of the Lower Yakima River and the Columbia River (Ritter 2015). **The project is expected to have no impact to bald or golden eagles because there are no known nests or territories in this area and the work.**

## 8 Effect Determinations

As presented, the proposed project is not expected to cause adverse effects to the Lower Yakima River and its side channel. This action, as proposed, will have **no effect** to bull trout, Gray wolf, Yellow-billed cuckoo, Northern wormwood or their designated critical habitat.

The project **may affect but is not likely to adversely affect Middle Columbia River Steelhead** as previously stated. There will be no in-water work, blasting or vibratory impacts. Steelhead will not be spawning in the action area and adults migrating through are not expected to be present during the construction periods. Juveniles that are expected to be present year-round will not be abundant in the action area during construction due to high temperatures. In addition, the tree removal on the shoreline will remove six non-native species and replace them with approximately 400 native trees and shrubs, which will be a benefit to the species in the long-term. BMPs including stormwater collection and treatment, silt fence, fiber wattles, erosion control seeding and revegetation will minimize potential water

quality impacts. **No adverse effects to EFH are expected to occur.** See Table 3. Summary of Effect Determinations.

**Table 3. Summary of Effect Determinations**

Species Common Name	Effect Determination	Critical Habitat Effect Determination
<b>USFWS</b>		
Bull Trout	NE*	NE
Gray Wolf	NE	NE
Yellow-Billed Cuckoo	NE	NE
Northern Wormwood	NE	None Designated
<b>NMFS</b>		
Middle Columbia River Steelhead	NLAA**	NLAA
<b>MSA</b>		
No Adverse Effects		
<b>FWCA</b>		
Not Applicable		
<b>Migratory Bird Treaty Act</b>		
No Taking		
<b>Bald and Golden Eagle Protection Act</b>		
No Impact		

\*NE-No Effect

\*\*NLAA-May Affect Not Likely to Adversely Affect

This project will require further review in order to re-analyze the potential adverse effects on federally protected species or habitats if any significant changes in the action are proposed or occur after the date of this document.

## 9 References

- Ebird 2015. Cornell and Audubon. Search database for Yellow-billed cuckoo occurrences on EBird accessed at <http://ebird.org/ebird/eBirdReports?cmd=Start> on November 17, 2015.
- US Army Corps of Engineers (USACE). Email communication with Kristen Shacochis-Brown, USACE Biologist on November 17, 2015 regarding USACE surveys and findings for two yellow-billed cuckoo nest near Boise, Idaho.
- NOAA Fisheries, National Marine Fisheries Service (NMFS); West Coast Region, Listed Species; Pacific Coast Salmon accessed at: [http://www.westcoast.fisheries.noaa.gov/protected\\_species/species\\_list/species\\_lists.html](http://www.westcoast.fisheries.noaa.gov/protected_species/species_list/species_lists.html) on October 20, 2015.
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- Polite, C. and J. Pratt. 1999. Bald eagle (*Haliaeetus leucocephalus*). California Wildlife Habitat Relationships System, California Department of Fish and Game, California Interagency Wildlife Task Group. Sacramento, California.
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- USFWS (USFWS 2015c). Ecos: Candidate Assessment. Accessed at [http://ecos.fws.gov/docs/candidate/assessments/2014/r1/Q2XG\\_P01.pdf](http://ecos.fws.gov/docs/candidate/assessments/2014/r1/Q2XG_P01.pdf) on October 28, 2015.



Van Stralen, Personal communication with Greg Van Stralen, Biologist, on October 28, 2015 regarding the project, listed species and critical habitat, migration and rearing timing and habitat.

WA Department of Ecology (Ecology 2015); Environmental Assessment, River and Stream WQ Monitoring, Yakima River at Kiona Monitoring Station accessed at: <https://fortress.wa.gov/ecy/eap/riverwq/station> on October 30, 2015.

Yeager, Personal communication with Justin Yeager, Biologist, on October 29, 2015 regarding the project, listed species and critical habitat that could occur in the action area, migration and rearing timing and habitat, and potential impacts.

## APPENDIX A. PHOTOS

Levee South of Van Giesen Bridge-facing south



Cul-de-sac-from levee facing southwest



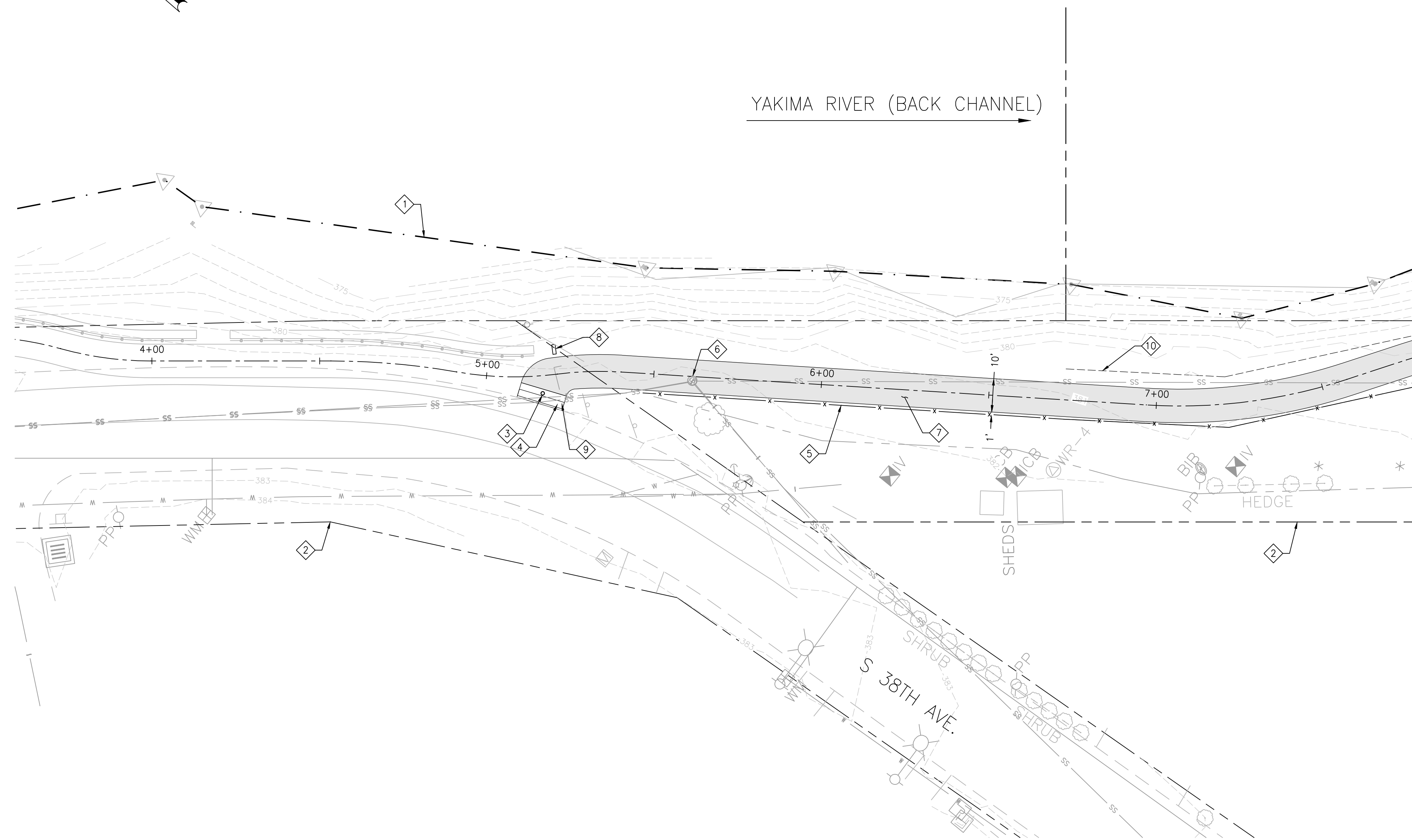
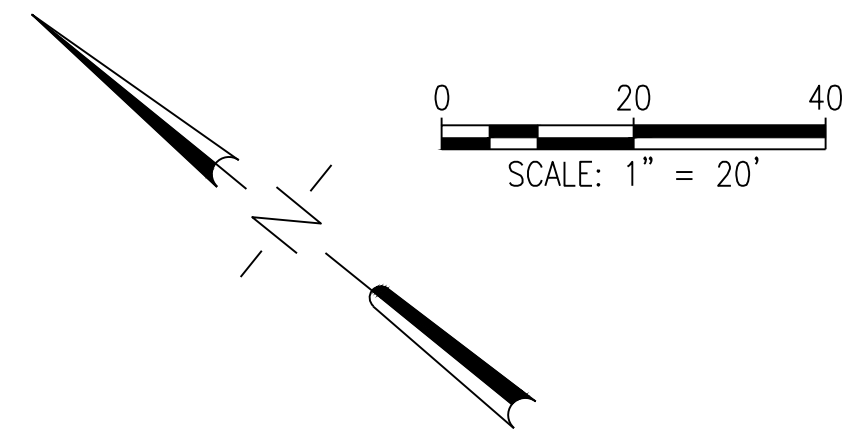
Under Bridge Facing North



Near Wetland A Facing East



## APPENDIX B. DESIGN PLANS



**GENERAL NOTES**

1. INTERPRETIVE SIGNAGE LOCATIONS SHOWN FOR INSTALLATION PURPOSES ONLY. CITY SHALL PROVIDE SIGNS TO CONTRACTOR FOR CONTRACTOR TO INSTALL.
2. AUTOCAD FILES WILL BE PROVIDED FOR TRAIL STAKING TO ENSURE COMPLIANCE WITH THE EASEMENT REQUIREMENTS.

**KEY NOTES**

- 1 WETLAND BOUNDARY
- 2 RIGHT-OF-WAY
- 3 REMOVABLE BOLLARD  
MODEL: B-3 6" DECORATIVE STEEL BOLLARD  
MANUFACTURER: FAIR WEATHER SF & ACCESSORIES,  
1-360-895-2626  
COLOR: BLUE, POWDER COATED, WITH CORROSION RESISTANT UNDERCOAT. HOT DIP GALVANIZING ON RECEIVER  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE.  
INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 4 TACTILE WARNING, SEE SPECIFICATIONS AND KEY NOTE 9.
- 5 3' TALL CHAIN LINK FENCE WITH TOP RAIL  
INSTALL PER WSDOT STANDARD TYPE 6 CHAIN LINK FENCE WITH TOP RAIL, SIMILAR TO 4' TALL FENCE. FENCE TO BE OFFSET 1' FROM EDGE OF TRAIL.
- 6 ADJUST EXISTING MANHOLE TO GRADE
- 7 10' WIDE ASPHALT TRAIL, SEE DETAIL 5, SHEET G1.0
- 8 INTERPRETIVE SIGN, SEE SHEET F3.0, PLAN & ELEVATION @ EX4
- 9 TACTILE WARNING ON CONCRETE PAD, SEE DETAIL 3, SHEET G1.1 FOR LAYOUT
- 10 TRAIL EASEMENTS, TYPICAL.

PRELIMINARY  
NOT FOR  
CONSTRUCTION

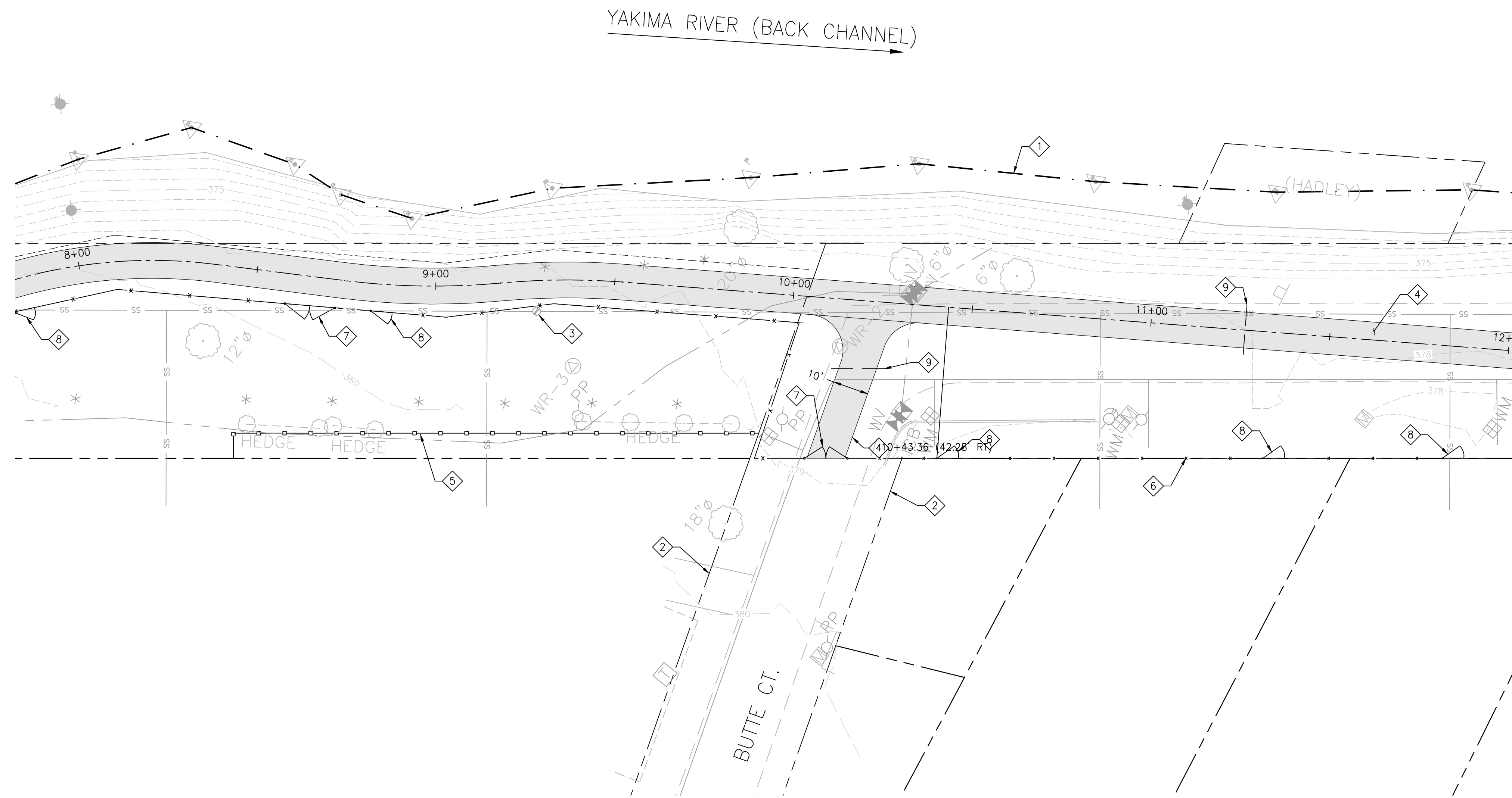
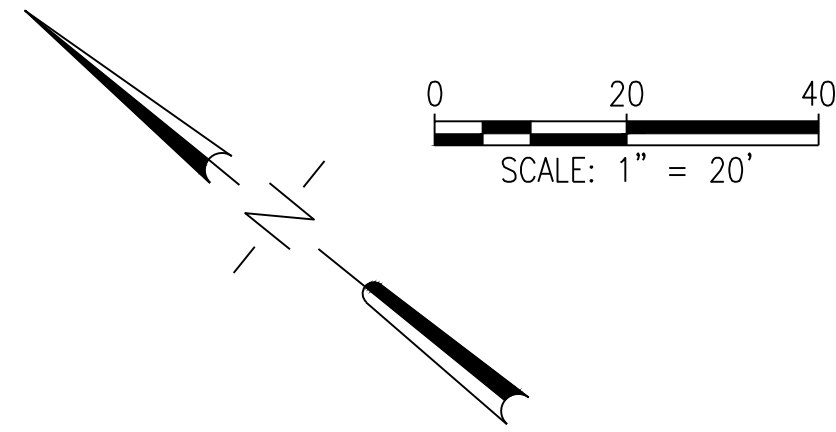
YAKIMA RIVER GATEWAY  
WEST RICHLAND, WASHINGTON  
**TRAIL LAYOUT PLAN**

REVISIONS:


JOB NO.: 15918  
DATE: 7/17/2015  
SCALE: 1" = 20'  
DESIGNED BY: BC  
DRAWN BY: EM  
CHECKED BY:

60% PLAN SET





**GENERAL NOTES**

1. INTERPRETIVE SIGNAGE LOCATIONS SHOWN FOR INSTALLATION PURPOSES ONLY. CITY SHALL PROVIDE SIGNS TO CONTRACTOR FOR CONTRACTOR TO INSTALL.
2. AUTOCAD FILES WILL BE PROVIDED FOR TRAIL STAKING TO ENSURE COMPLIANCE WITH THE EASEMENT REQUIREMENTS.

**KEY NOTES**

- 1. WETLAND BOUNDARY
- 2. RIGHT-OF-WAY
- 3. ADJUST EXISTING MANHOLE TO GRADE
- 4. 10' WIDE ASPHALT TRAIL, SEE DETAIL 5, SHEET G1.0
- 5. 6' TALL CEDAR FENCE, SEE DETAIL 1, SHEET G1.2
- 6. 3' TALL CHAIN LINK FENCE WITH TOP RAIL  
INSTALL PER WSDOT STANDARD TYPE 6 CHAIN LINK FENCE WITH TOP RAIL. SIMILAR TO 4' TALL FENCE. INSTALL 1' OFF OF THE EDGE OF TRAIL.
- 7. 14' WIDE, DOUBLE SWING GATE  
INSTALL PER WSDOT STANDARD DOUBLE CHAIN LINK GATE.
- 8. 3' WIDE, SINGLE SWING GATE  
INSTALL PER WSDOT STANDARD SINGLE CHAIN LINK GATE.
- 9. 6" IRRIGATION CROSSING SLEEVE, SEE SPECIFICATIONS

PRELIMINARY  
NOT FOR  
CONSTRUCTION

YAKIMA RIVER GATEWAY  
WEST RICHLAND, WASHINGTON  
**TRAIL LAYOUT PLAN**

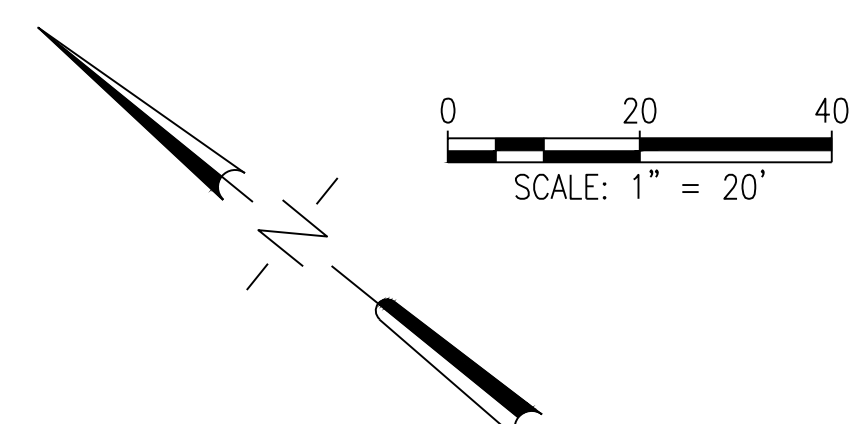
REVISIONS:

JOB NO.: 15918  
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DRAWN BY: EM  
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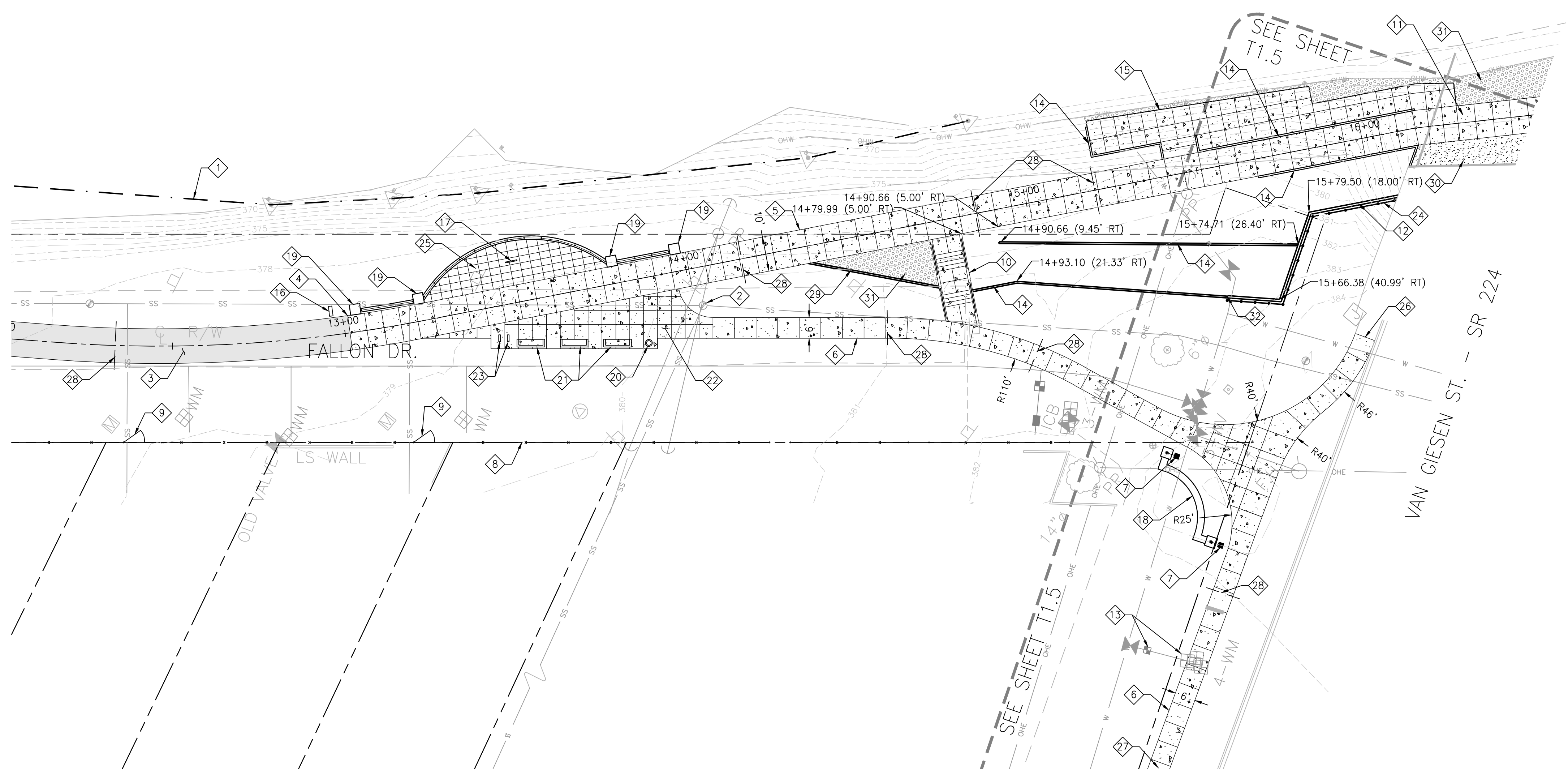
60% PLAN SET

T1.2





YAKIMA RIVER



**GENERAL NOTES**

1. INTERPRETIVE SIGNAGE LOCATIONS SHOWN FOR INSTALLATION PURPOSES ONLY. CITY SHALL PROVIDE SIGNS TO CONTRACTOR FOR CONTRACTOR TO INSTALL.
2. AUTOCAD FILES WILL BE PROVIDED FOR TRAIL STAKING TO ENSURE COMPLIANCE WITH THE EASEMENT REQUIREMENTS.

**KEY NOTES**

- 1 WETLAND BOUNDARY
- 2 ADJUST EXISTING MANHOLE TO GRADE
- 3 10' WIDE ASPHALT TRAIL, SEE DETAIL 5, SHEET G1.0
- 4 STA 13+1.43, END ASPHALT TRAIL, BEGIN CONCRETE SIDEWALK
- 5 10' WIDE CONCRETE SIDEWALK, SEE DETAIL 2, SHEET G1.0
- 6 6' WIDE CONCRETE SIDEWALK, SEE DETAIL 2, SHEET G1.0
- 7 LUMINAIRE (TYP.), SEE ELECTRICAL
- 8 3' TALL CHAIN LINK FENCE WITH TOP RAIL  
INSTALL PER WSDOT STANDARD TYPE 6 CHAIN LINK FENCE WITH TOP RAIL. SIMILAR TO 4' TALL FENCE.
- 9 3' WIDE, SINGLE SWING GATE  
INSTALL PER WSDOT STANDARD SINGLE CHAIN LINK GATE.
- 10 CONCRETE STAIRS WITH CHEEK WALL, SEE DETAILS 2 AND 3 ON SHEET G1.2
- 11 CONCRETE SIDEWALK AND RIVER ACCESS CONTINUE UNDER SR224 BRIDGE. BRIDGE NOT SHOWN FOR CLARITY.
- 12 CONCRETE RETAINING WALL TYPE II, SEE STRUCTURAL DRAWINGS
- 13 RELOCATE EXISTING WATER METERS AND VALVING OUT OF SIDEWALK
- 14 CONCRETE RETAINING WALL TYPE I, SEE DETAIL 1, SHEET G1.1
- 15 THICKENED CONCRETE EDGE, SEE DETAIL 2, SHEET G1.1
- 16 INTERPRETIVE SIGN, SEE SHEET F3.0, PLAN & ELEVATION @ EX4
- 17 INTERPRETIVE SIGN, SEE SHEET F2.0, PLAN, ELEVATION, & SIDE @ EX3
- 18 ENTRY SIGN, SEE ARCHITECTURAL PLANS SHEET A0.1
- 19 STONE VENEER COLUMN, SEE DETAIL 3, SHEET G1.5
- 20 TRASH RECEPTACLE  
MODEL: FC-12 CONCOURSE SERIES 36-GALLON LITTER RECEPTACLE WITH FC-12 COMPONENTS  
MANUFACTURER: VICTOR STANLEY, 1-855-8300  
COLOR: BLACK  
BLACK PLASTIC LINER, S-2B DOME LID (BLACK)  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE.  
SURFACE MOUNT, INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN. SEE DETAIL 3 SHEET G1.0.
- 21 BENCH WITH BACK  
MODEL: CBF-12 CITY SITES SERIES CONTOURED BENCH WITH CBF-12 COMPONENTS  
MANUFACTURER: VICTOR STANLEY, 1-855-8300  
COLOR: BLACK  
6" HORIZONTAL STEEL SLATS (BLACK)  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE.  
SURFACE MOUNT, INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN. SEE DETAIL 3 SHEET G1.0.
- 22 CONCRETE SIDEWALK, 4' PATTERN (SLAB). SEE DETAIL 2, SHEET G1.0.
- 23 BIKE RACK  
MODEL: BRBS-103 CYCLE SENTRY SERIES BIKE RACK WITH TUBULAR STEEL RING  
MANUFACTURER: VICTOR STANLEY, 1-855-8300  
COLOR: BLACK  
POWDER COAT OVER GALVANIZED FINISH.  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE.  
EMBED MOUNT, INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 24 STAINLESS STEEL CABLE RAILING GUARDRAIL (WITHOUT TOP RAIL), SEE DETAIL 2, SHEET G1.5, AND SPECIFICATIONS.  
MANUFACTURER: INLINE DESIGN, 1-425-405-5505
- 25 OVERLOOK, SEE DETAIL 1, SHEET G1.5 FOR ENLARGEMENT
- 26 MATCH EXISTING SIDEWALK AT BRIDGE ABUTMENT, SEE SHEET C1.3 FOR LIMITS OF SIDEWALK REMOVAL
- 27 SEE SHEET T1.5 FOR CONTINUATION OF SIDEWALK
- 28 6" PVC SLEEVE FOR IRRIGATION, SEE SPECIFICATIONS
- 29 6" WIDE CONCRETE CURB, SEE DETAIL 9, SHEET G1.0
- 30 5/8" GRAVEL, 4" DEPTH
- 31 RE-USED RIP RAP.
- 32 END OF GUARDRAIL AND TYPE II RETAINING WALL



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PRELIMINARY  
NOT FOR  
CONSTRUCTION

YAKIMA RIVER GATEWAY  
WEST RICHLAND, WASHINGTON  
**TRAIL LAYOUT PLAN**

REVISIONS:


JOB NO.: 15918  
DATE: 7/17/2015  
SCALE: 1" = 20'  
DESIGNED BY: BC  
DRAWN BY: EM  
CHECKED BY:

60% PLAN SET

T1.3

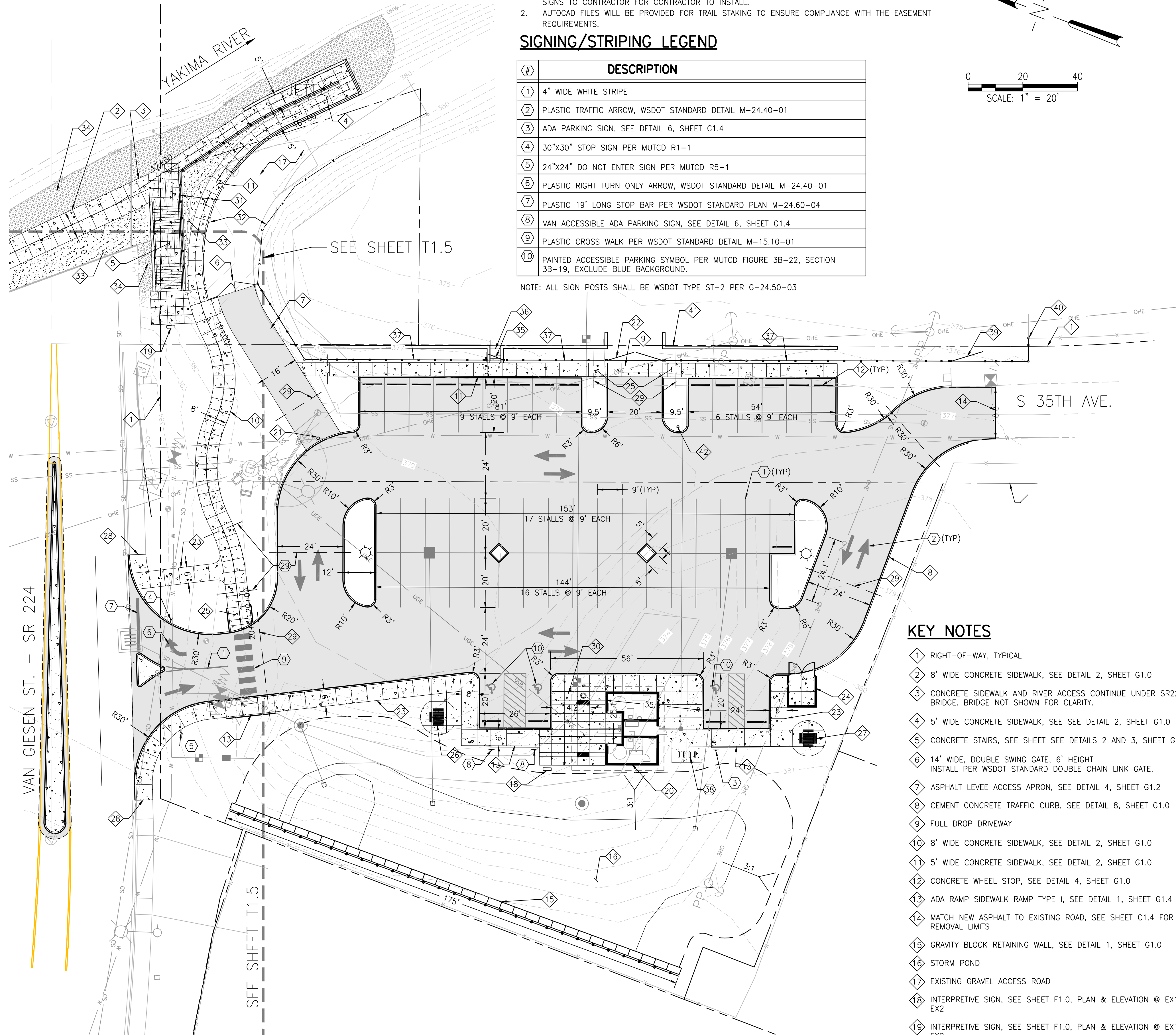
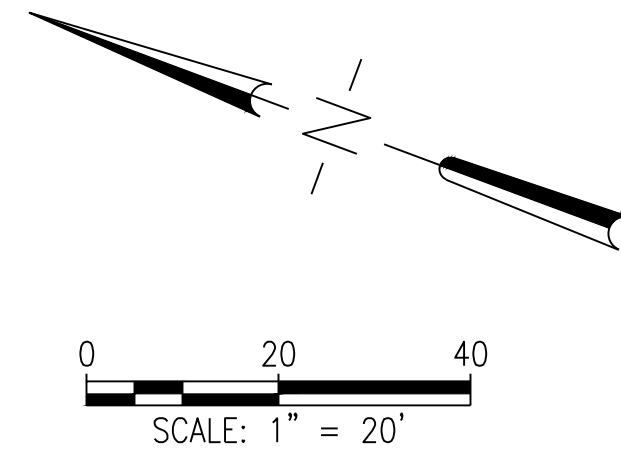
**GENERAL NOTES**

1. INTERPRETIVE SIGNAGE LOCATIONS SHOWN FOR INSTALLATION PURPOSES ONLY. CITY SHALL PROVIDE SIGNS TO CONTRACTOR FOR CONTRACTOR TO INSTALL.
2. AUTOCAD FILES WILL BE PROVIDED FOR TRAIL STAKING TO ENSURE COMPLIANCE WITH THE EASEMENT REQUIREMENTS.

**SIGNING/STRIPING LEGEND**

#	DESCRIPTION
1	4" WIDE WHITE STRIPE
2	PLASTIC TRAFFIC ARROW, WSDOT STANDARD DETAIL M-24.40-01
3	ADA PARKING SIGN, SEE DETAIL 6, SHEET G1.4
4	30"x30" STOP SIGN PER MUTCD R1-1
5	24"x24" DO NOT ENTER SIGN PER MUTCD R5-1
6	PLASTIC RIGHT TURN ONLY ARROW, WSDOT STANDARD DETAIL M-24.40-01
7	PLASTIC 19' LONG STOP BAR PER WSDOT STANDARD PLAN M-24.60-04
8	VAN ACCESSIBLE ADA PARKING SIGN, SEE DETAIL 6, SHEET G1.4
9	PLASTIC CROSS WALK PER WSDOT STANDARD DETAIL M-15.10-01
10	PAINTED ACCESSIBLE PARKING SYMBOL PER MUTCD FIGURE 3B-22, SECTION 3B-19, EXCLUDE BLUE BACKGROUND.

NOTE: ALL SIGN POSTS SHALL BE WSDOT TYPE ST-2 PER G-24.50-03



**KEY NOTES**

- 1 RIGHT-OF-WAY, TYPICAL
- 2 8' WIDE CONCRETE SIDEWALK, SEE DETAIL 2, SHEET G1.0
- 3 CONCRETE SIDEWALK AND RIVER ACCESS CONTINUE UNDER SR224 BRIDGE. BRIDGE NOT SHOWN FOR CLARITY.
- 4 5' WIDE CONCRETE SIDEWALK, SEE DETAIL 2, SHEET G1.0
- 5 CONCRETE STAIRS, SEE SHEET SEE DETAILS 2 AND 3, SHEET G1.2
- 6 14' WIDE, DOUBLE SWING GATE, 6' HEIGHT  
INSTALL PER WSDOT STANDARD DOUBLE CHAIN LINK GATE.
- 7 ASPHALT LEVEE ACCESS APRON, SEE DETAIL 4, SHEET G1.2
- 8 CEMENT CONCRETE TRAFFIC CURB, SEE DETAIL 8, SHEET G1.0
- 9 FULL DROP DRIVEWAY
- 10 8' WIDE CONCRETE SIDEWALK, SEE DETAIL 2, SHEET G1.0
- 11 5' WIDE CONCRETE SIDEWALK, SEE DETAIL 2, SHEET G1.0
- 12 CONCRETE WHEEL STOP, SEE DETAIL 4, SHEET G1.0
- 13 ADA RAMP SIDEWALK RAMP TYPE I, SEE DETAIL 1, SHEET G1.4
- 14 MATCH NEW ASPHALT TO EXISTING ROAD, SEE SHEET C1.4 FOR REMOVAL LIMITS
- 15 GRAVITY BLOCK RETAINING WALL, SEE DETAIL 1, SHEET G1.0
- 16 STORM POND
- 17 EXISTING GRAVEL ACCESS ROAD
- 18 INTERPRETIVE SIGN, SEE SHEET F1.0, PLAN & ELEVATION @ EX1 & EX2
- 19 INTERPRETIVE SIGN, SEE SHEET F1.0, PLAN & ELEVATION @ EX1 & EX2
- 20 RESTROOM, SEE ARCHITECTURAL PLANS
- 21 REMOVEABLE BOLLARD  
MODEL: B-3 6" DECORATIVE STEEL BOLLARD  
MANUFACTURER: FAIR WEATHER SF & ACCESSORIES, 1-360-895-2626  
COLOR: BLUE, POWDER COATED, WITH CORROSION RESISTANT UNDERCOAT. HOT DIP GALVANIZING ON RECEIVER  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE.  
INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 22 20' WIDE DOUBLE SWING GATE, 6' HEIGHT  
MODEL: SANIBEL, OR APPROVED EQUAL  
MANUFACTURER: MIGHTY MULE E-Z GATE SYSTEMS, 1-850-575-0176  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE.  
INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 23 6' WIDE CONCRETE SIDEWALK, SEE DETAIL 2, SHEET G1.0
- 24 TRASH ENCLOSURE, SEE ARCHITECTURAL DRAWINGS
- 25 ADA SIDEWALK RAMP TYPE II, SEE DETAIL 4, SHEET G1.4
- 26 PICNIC TABLE  
MODEL: CRPR-3  
MANUFACTURER: VICTOR STANLEY, 1-855-8300  
COLOR: BLACK, POWDER COATED  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE.  
IN-GROUND MOUNT, INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 27 PICNIC TABLE  
MODEL: CRPR-4  
MANUFACTURER: VICTOR STANLEY, 1-855-8300  
COLOR: BLACK, POWDER COATED  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE.  
IN-GROUND MOUNT, INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 28 MATCH EXISTING SIDEWALK AT BRIDGE ABUTMENT, SEE SHEET C1.4 FOR LIMITS OF REMOVAL
- 29 6" PVC SLEEVE FOR IRRIGATION, SEE SPECIFICATIONS
- 30 TRASH RECEPTACLE  
MODEL: FC-12 CONCOURSE SERIES 36-GALLON LITTER RECEPTACLE WITH FC-12 COMPONENTS  
MANUFACTURER: VICTOR STANLEY, 1-301-855-8300  
COLOR: BLACK  
BLACK PLASTIC LINER, S-2B DOME LID (BLACK)  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE.  
SURFACE MOUNT, INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 31 STAINLESS STEEL CABLE RAILING GUARDRAIL (WITHOUT TOP RAIL), SEE DETAIL 2, SHEET G1.5, AND SPECIFICATIONS.  
MANUFACTURER: INLINE DESIGN, 1-425-405-5505
- 32 6' TALL CHAIN LINK FENCE WITH TOP RAIL  
INSTALL PER WSDOT STANDARD TYPE 1 CHAIN LINK FENCE WITH TOP RAIL.
- 33 5/8" GRAVEL, 4" DEPTH
- 34 RE-USED RIP RAP.
- 35 6' WIDE SINGLE SWING GATE, 6' HEIGHT  
MODEL: SANIBEL, OR APPROVED EQUAL  
MANUFACTURER: MIGHTY MULE E-Z GATE SYSTEMS, 1-850-575-0176  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE.  
INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 36 CONCRETE STAIRS WITH CHEEK WALL, SEE DETAILS 2 AND 3 ON SHEET G1.2
- 37 DECORATIVE ROCK WALL, 6' HEIGHT  
MODEL: ECO-STONE, OR APPROVED EQUAL  
MANUFACTURER: SIMTEK FENCE, 1-801-655-5236  
COLOR: GRAY  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE.  
INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 38 BIKE RACK  
MODEL: BRBS-103 CYCLE SENTRY SERIES BIKE RACK WITH TUBULAR STEEL RING  
MANUFACTURER: VICTOR STANLEY, 1-855-8300  
COLOR: BLACK  
POWDER COAT OVER GALVANIZED FINISH.  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE.  
EMBED MOUNT, INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 39 12' WIDE SINGLE SWING GATE, 6' HEIGHT  
MODEL: SANIBEL, OR APPROVED EQUAL  
MANUFACTURER: MIGHTY MULE E-Z GATE SYSTEMS, 1-850-575-0176  
SUBMIT SHOP DRAWINGS FOR VERIFICATION BY OWNER'S REPRESENTATIVE.  
INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 40 TIE DECORATIVE ROCK WALL INTO ADJACENT EXISTING FENCE.
- 41 SEGMENTED BLOCK WALL  
KEYSTONE STRAIGHT FACED GARDEN WALL  
MANUFACTURER: KEYSTONE RETAINING WALL SYSTEMS, LLC  
COLOR: GREY  
INSTALL PER MANUFACTURER'S SPECIFICATIONS AT LOCATION SHOWN.
- 42 LOCKABLE MAILBOX  
MODEL:  
OWNER PROVIDED, CONTRACTOR INSTALLED

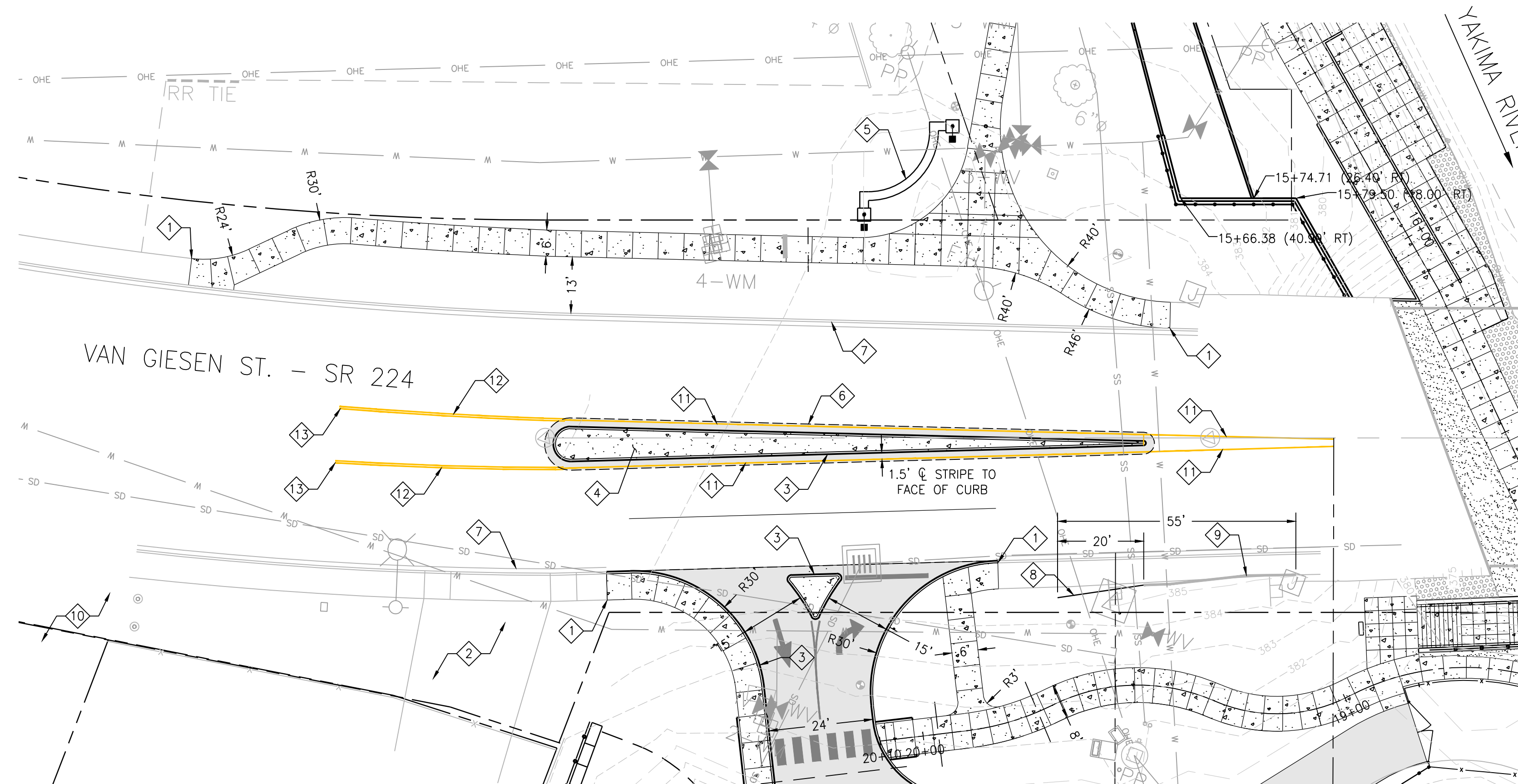
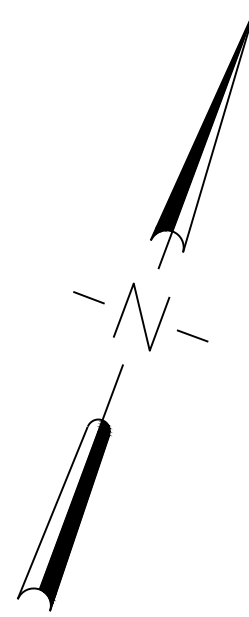
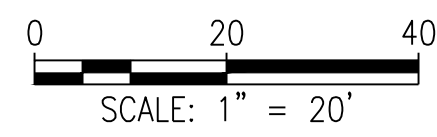
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CONSTRUCTION

REVISIONS:


JOB NO.: 15918  
DATE: 7/17/2015  
SCALE: 1" = 20'  
DESIGNED BY: BC  
DRAWN BY: EM  
CHECKED BY:

60% PLAN SET





**GENERAL NOTES**

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2. AUTOCAD FILES WILL BE PROVIDED FOR TRAIL STAKING TO ENSURE COMPLIANCE WITH THE EASEMENT REQUIREMENTS.

**KEY NOTES**

1. 6" WIDE CONCRETE SIDEWALK, SEE DETAIL 2, SHEET G1.0. MATCH EXISTING.
2. EXISTING DRIVEWAY TO REMAIN
3. CEMENT CONCRETE TRAFFIC CURB, SEE DETAIL 8, SHEET G1.0
4. RAISED CONCRETE ISLAND
5. ENTRY SIGN, SEE ARCHITECTURAL DRAWINGS
6. PATCH EXISTING ASPHALT PER CITY OF WEST RICHLAND STANDARD TRENCH PAVEMENT RESTORATION DETAIL
7. EXISTING CURB AND GUTTER
8. INSTALL 20' OF SALVAGED GUARDRAIL. FIELD VERIFY PLACEMENT WITH ENGINEER PRIOR TO SETTING. TOTAL LENGTH OF GUARDRAIL SHALL BE 55' TO BRIDGE ABUTMENT.
9. EXISTING BEAM TYPE GUARDRAIL
10. NEW PLANTING BED
11. INSTALL 4" WIDE YELLOW PLASTIC SOLID LANE LINE PER WSDOT STANDARD PLAN M-20.10-02
12. INSTALL 4" WIDE YELLOW PLASTIC DOUBLE YELLOW CENTERLINE PER WSDOT STANDARD PLAN M-20.10-02
13. MATCH EXISTING STRIPING LOCATION

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YAKIMA RIVER GATEWAY  
WEST RICHLAND, WASHINGTON  
**TRAIL LAYOUT PLAN**

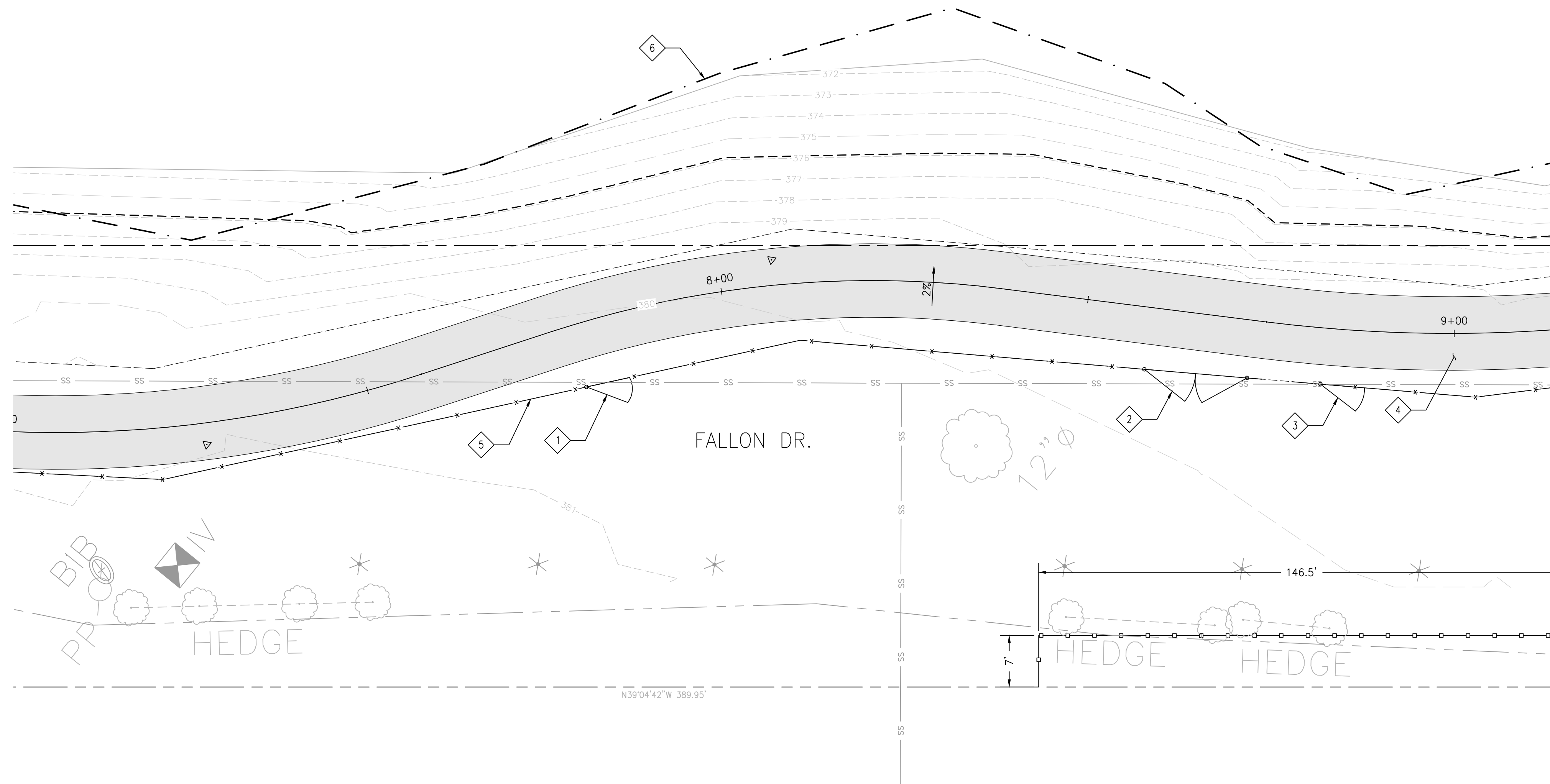
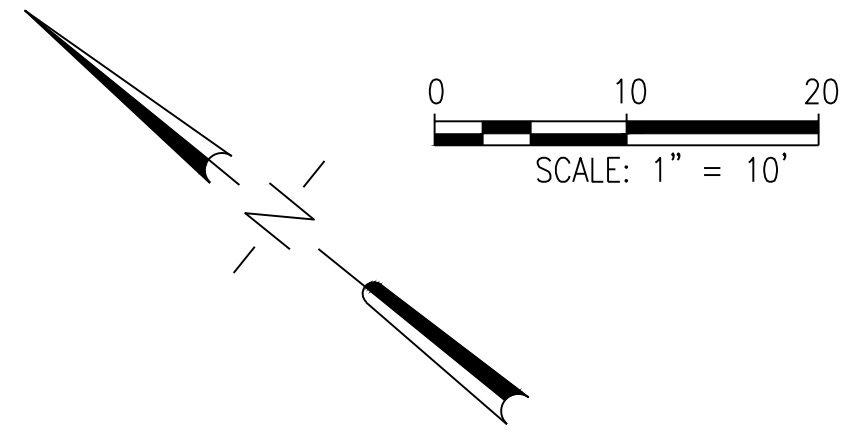
REVISIONS:


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DATE: 7/17/2015  
SCALE: 1" = 20'  
DESIGNED BY: BC  
DRAWN BY: EM  
CHECKED BY:

60% PLAN SET



T1.5



**GENERAL NOTES**

**KEY NOTES**

- 1 3' CHAINLINK GATE, START AT STATION 7+78.55 (8.60' RT)
- 2 14' DOUBLE CHAINLINK GATE, START AT STATION 8+58.77 (6.45' RT)
- 3 6' CHAINLINK GATE, START AT STATION 8+82.49 (7.66' RT)
- 4 10' WIDE ASPHALT TRAIL, SEE DETAIL 5, SHEET C1.0
- 5 TRAIL EASEMENT, TYPICAL
- 6 WETLAND BOUNDARY

YAKIMA RIVER GATEWAY  
 WEST RICHLAND, WASHINGTON  
 GRADING & LAYOUT ENLARGEMENTS

REVISIONS:


JOB NO.: 15918  
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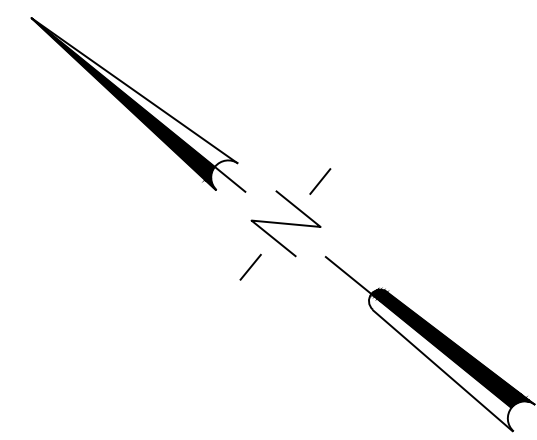
60% PLAN SET

T2.0



PRELIMINARY  
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 CONSTRUCTION

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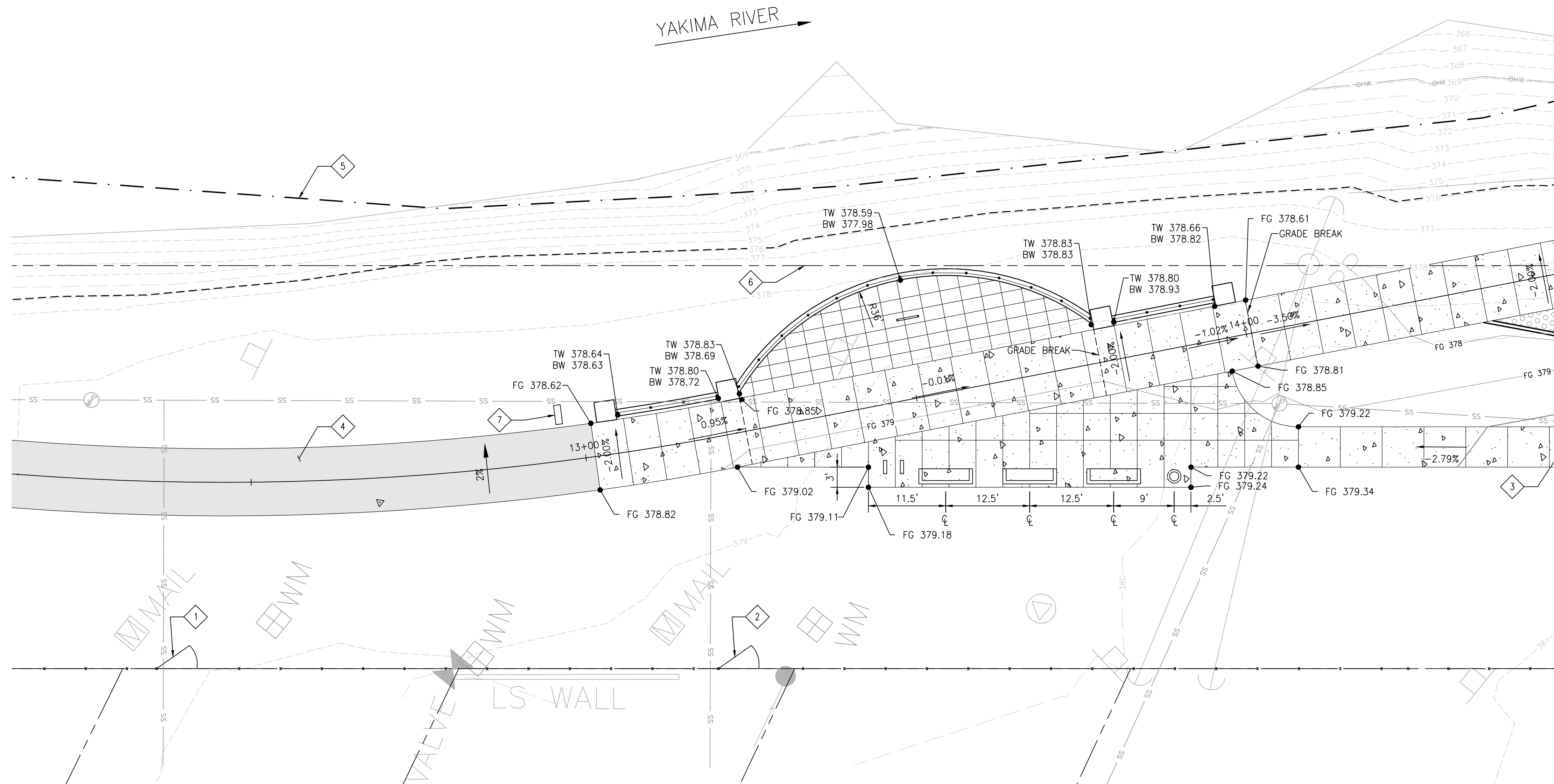
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SCALE: 1" = 10'

YAKIMA RIVER

**GENERAL NOTES**

**KEY NOTES**

- 1 6" CHAINLINK GATE, START AT STATION 12+36.58 (27.86' RT)
- 2 6" CHAINLINK GATE, START AT STATION 13.14.11 (34.01' RT)
- 3 SEE SHEET T2.2 FOR EXTENSION
- 4 10' WIDE ASPHALT TRAIL, SEE DETAIL 5, SHEET C1.0
- 5 WETLAND BOUNDARY
- 6 RIGHT-OF-WAY
- 7 INTERPRETIVE SIGN, START AT STATION 12+96.68 (5.50' LT)



YAKIMA RIVER GATEWAY  
WEST RICHLAND, WASHINGTON

GRADING & LAYOUT ENLARGEMENTS

REVISIONS:

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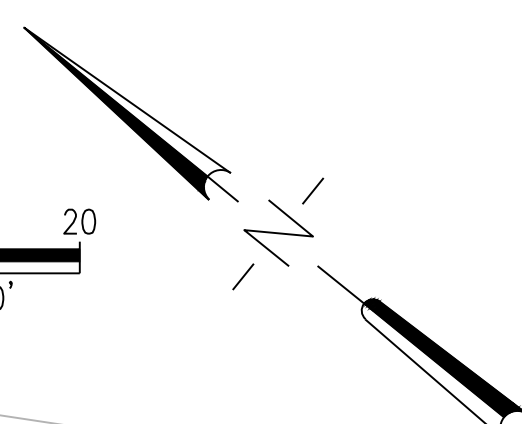
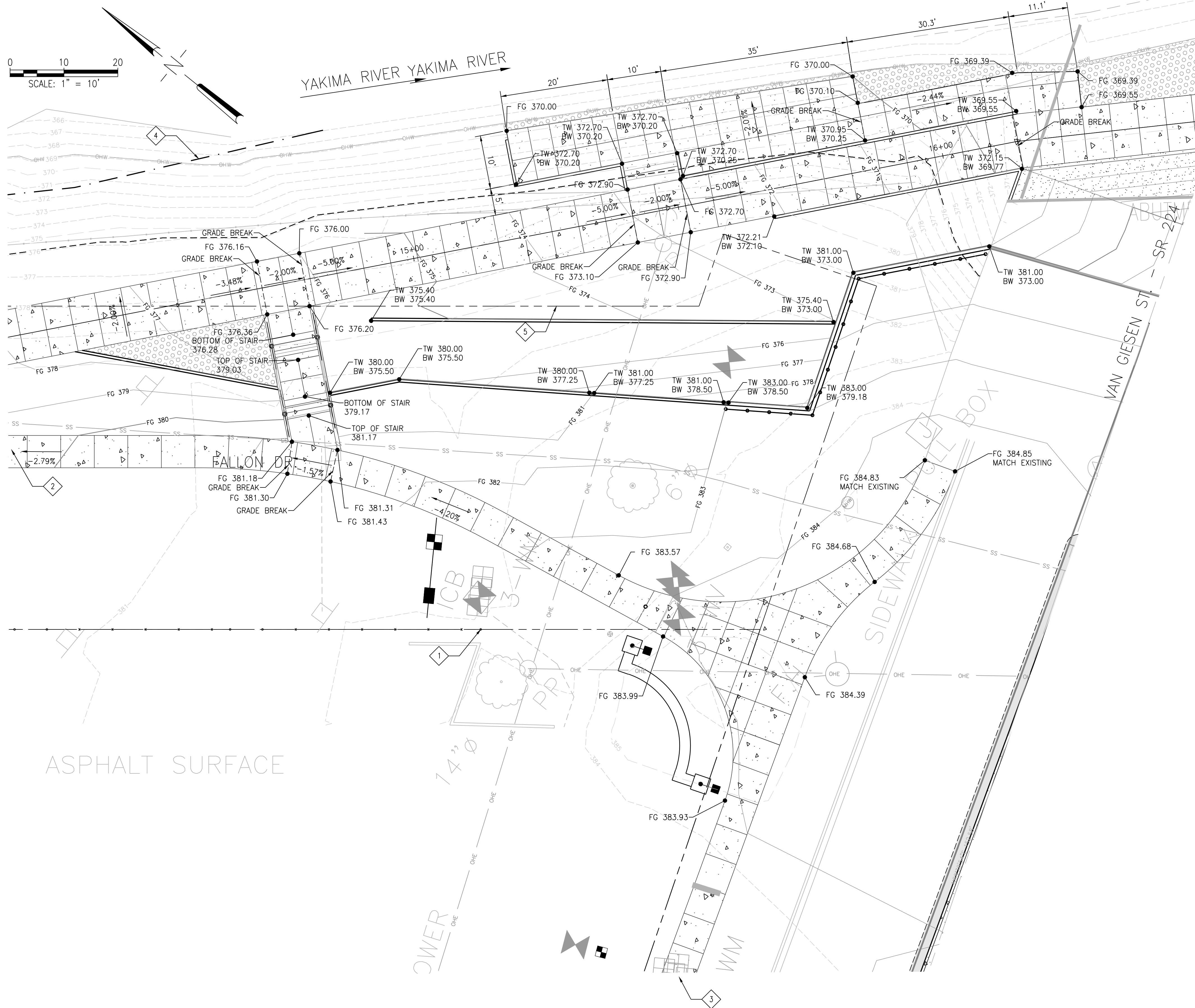
T2.1

NO. 22 OF 50

PRELIMINARY  
NOT FOR  
CONSTRUCTION

**MacKay Sposito**  
ENERGY PUBLIC WORKS LAND DEVELOPMENT  
www.mackaysposito.com

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**GENERAL NOTES**

**KEY NOTES**

- 1 END CHAINLINK FENCE AT STATION 14+99.07 (69.95' RT)
- 2 SEE SHEET T2.1 FOR EXTENSION
- 3 SEE SHEET T2.3 FOR EXTENSION
- 4 WETLAND BOUNDARY
- 5 RIGHT-OF-WAY

PRELIMINARY  
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 CONSTRUCTION

YAKIMA RIVER GATEWAY  
 WEST RICHLAND, WASHINGTON  
**GRADING & LAYOUT ENLARGEMENTS**

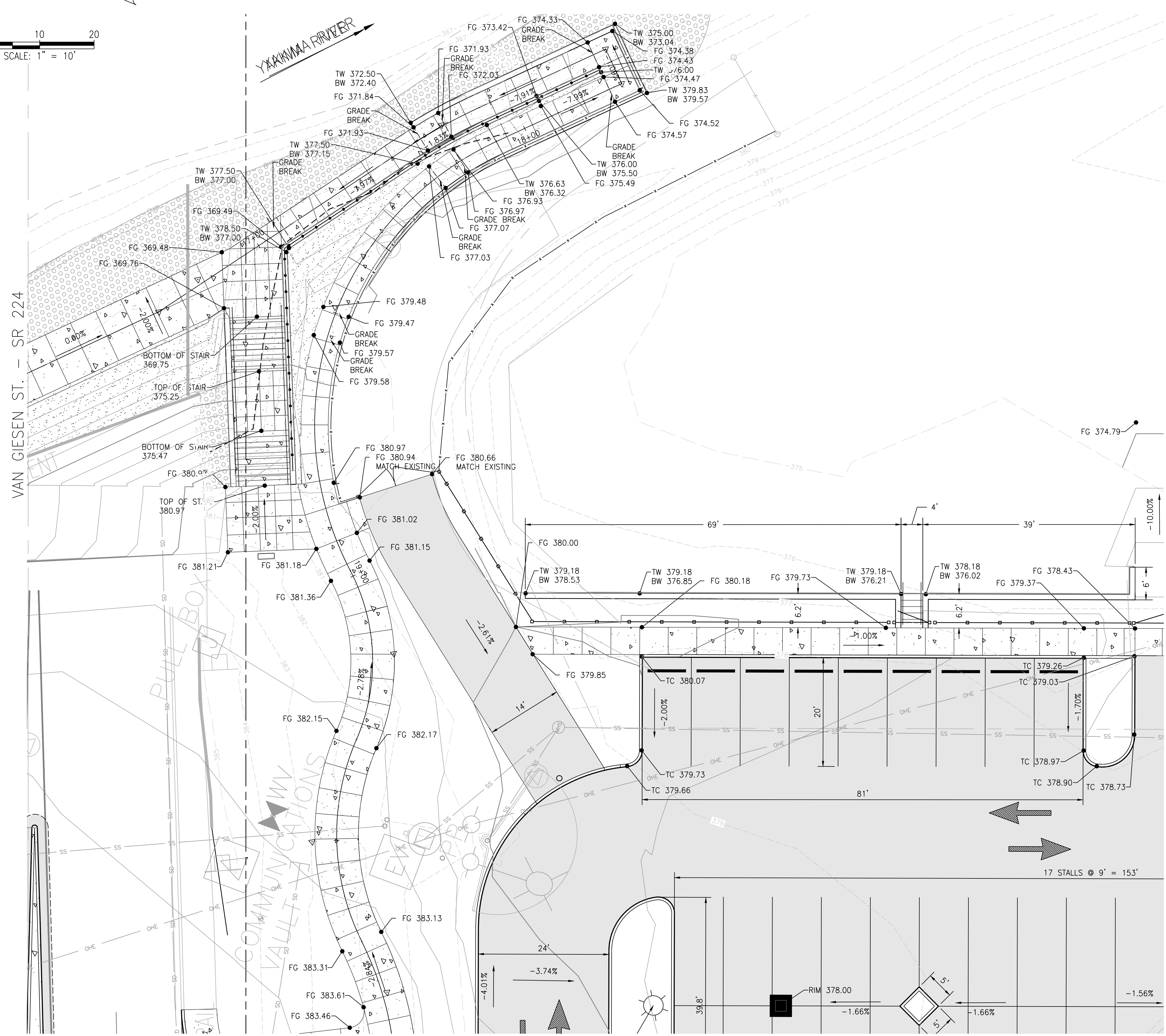
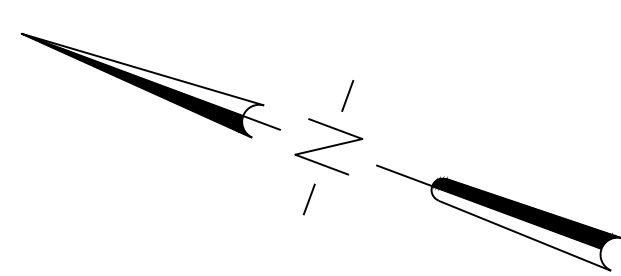
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60% PLAN SET

T2.2



**GENERAL NOTES**

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WEST RICHLAND, WASHINGTON  
**GRADING & LAYOUT ENLARGEMENTS**

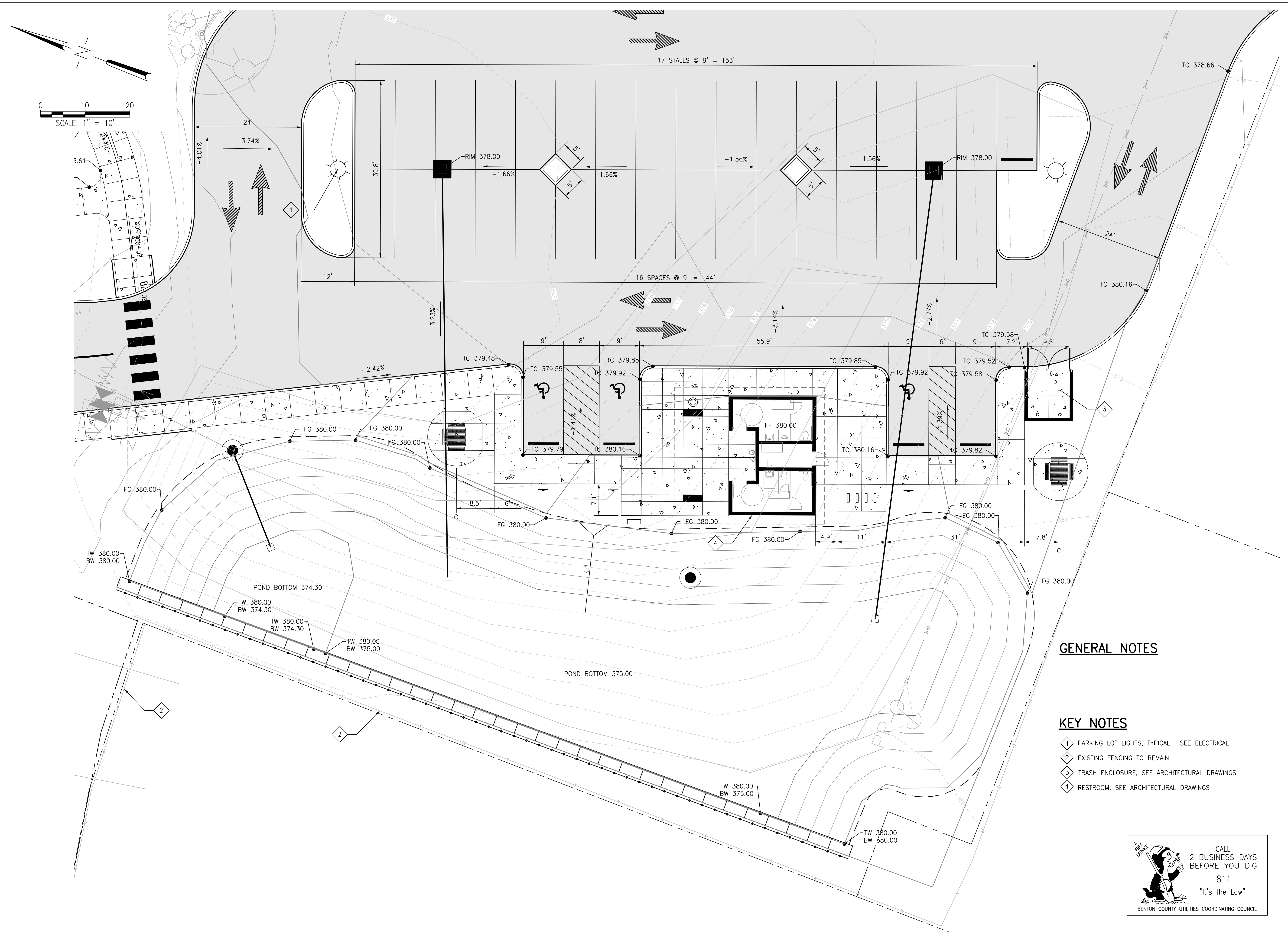
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DESIGNED BY: BC  
DRAWN BY: EM  
CHECKED BY:



60% PLAN SET

T2.3



**GENERAL NOTES**

**KEY NOTES**

- 1 PARKING LOT LIGHTS, TYPICAL. SEE ELECTRICAL
- 2 EXISTING FENCING TO REMAIN
- 3 TRASH ENCLOSURE, SEE ARCHITECTURAL DRAWINGS
- 4 RESTROOM, SEE ARCHITECTURAL DRAWINGS

CALL  
2 BUSINESS DAYS  
BEFORE YOU DIG  
811  
"It's the Law"  
BENTON COUNTY UTILITIES COORDINATING COUNCIL

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CONSTRUCTION

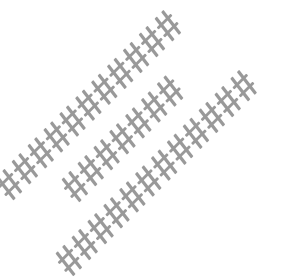
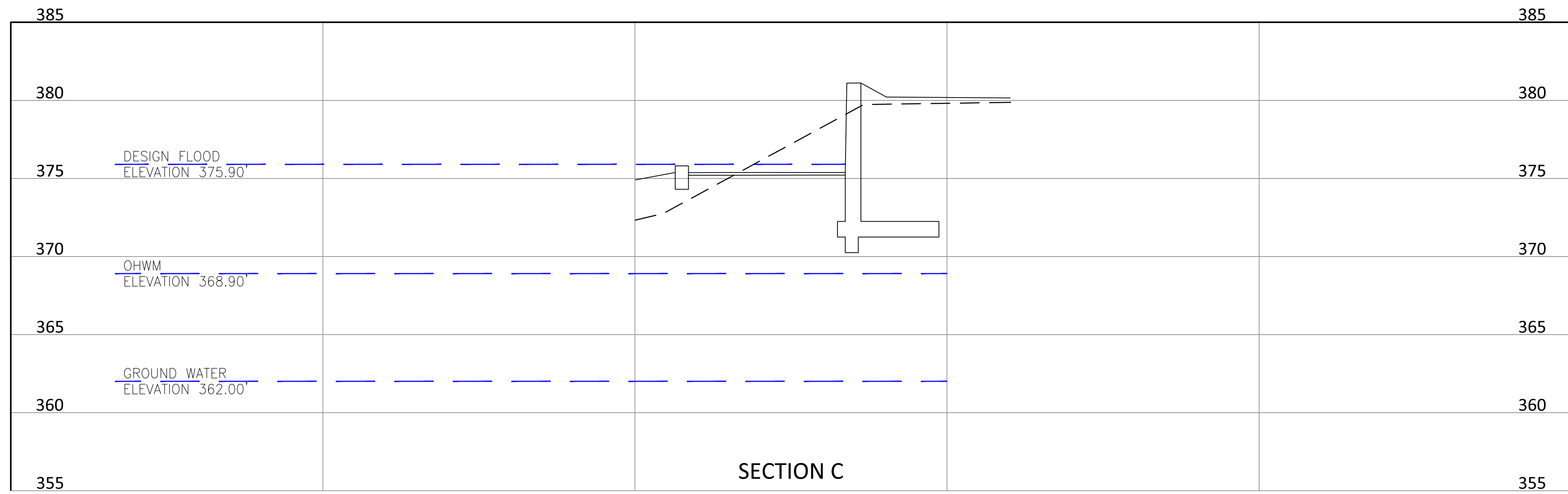
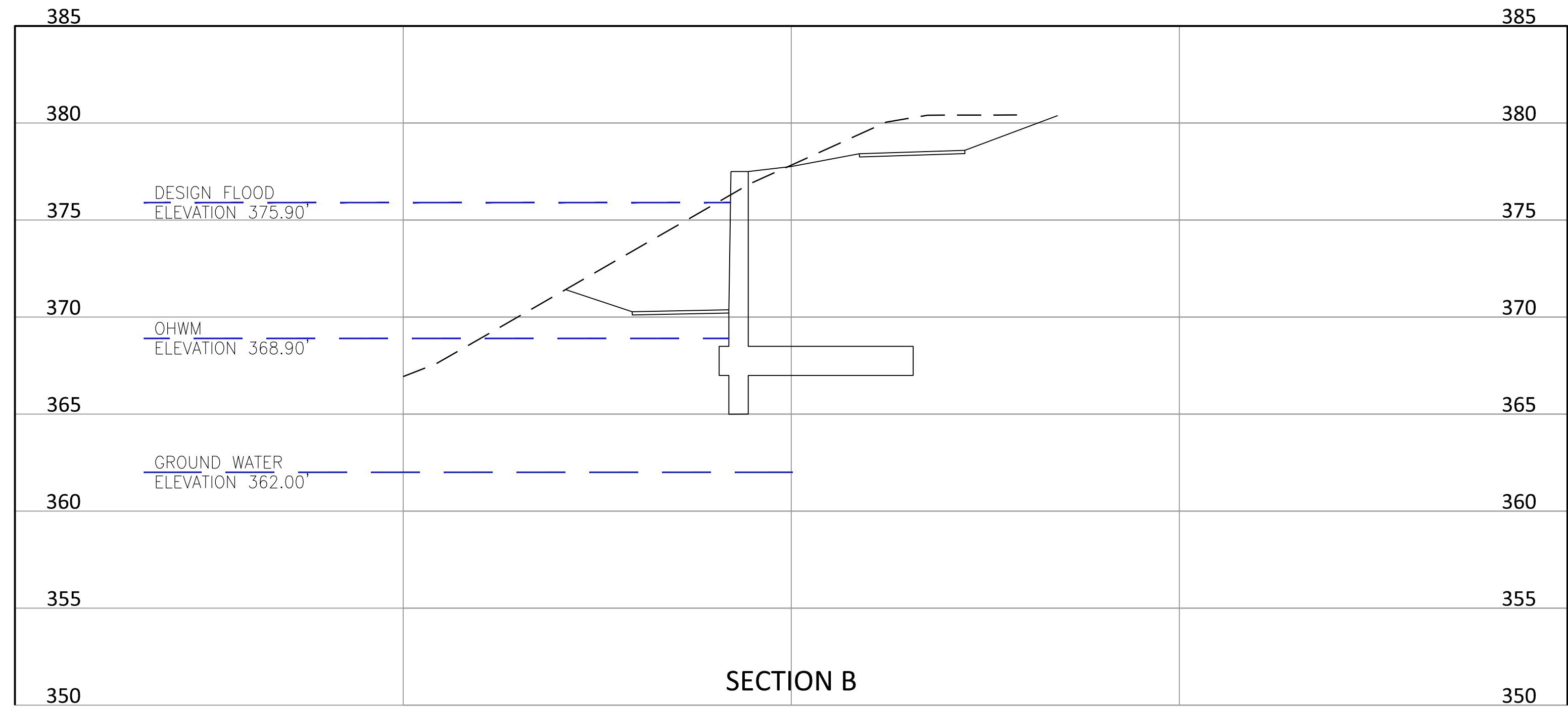
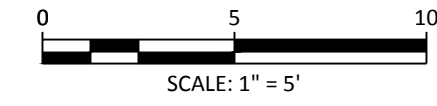
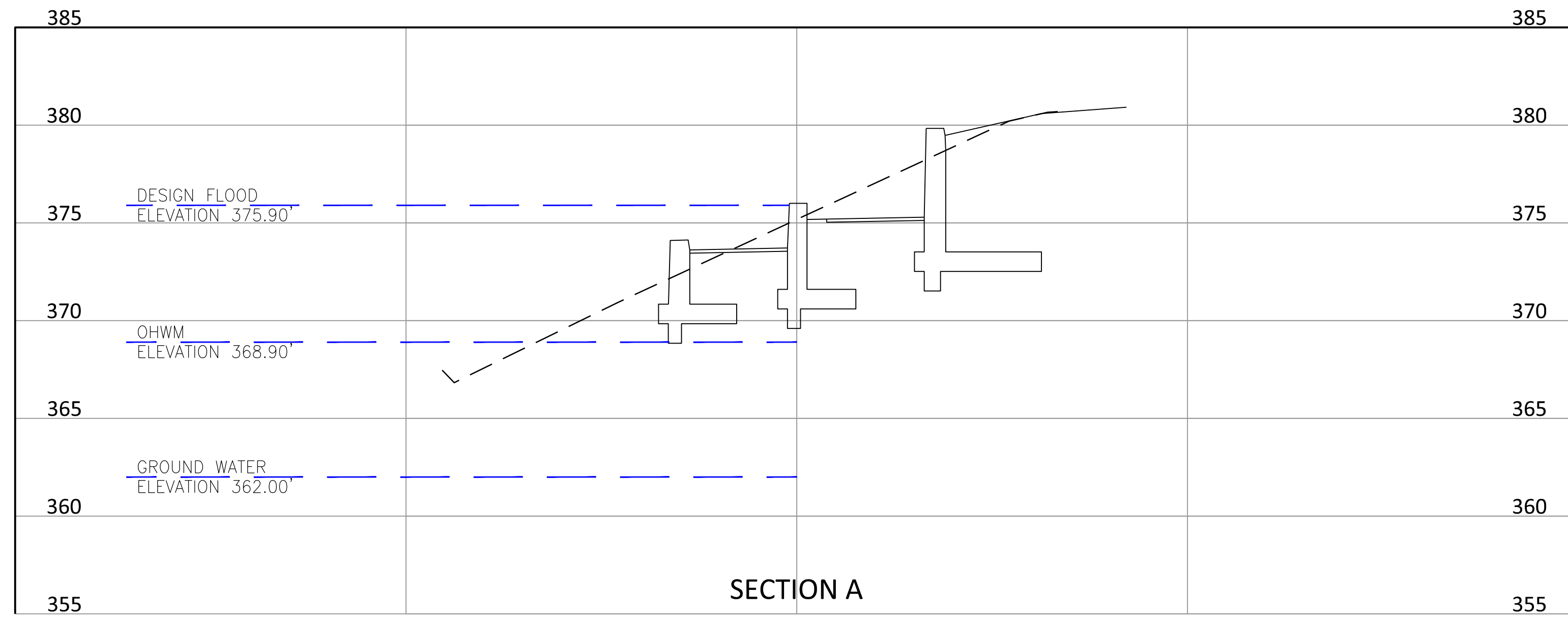
YAKIMA RIVER GATEWAY  
WEST RICHLAND, WASHINGTON  
**GRADING & LAYOUT ENLARGEMENTS**

REVISIONS:

JOB NO.: 15918  
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SCALE: 1" = 10'  
DESIGNED BY: BC  
DRAWN BY: EM  
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60% PLAN SET

T2.4



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REVISIONS:	
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CHECKED BY:	####

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**UNITED STATES DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL MARINE FISHERIES SERVICE  
West Coast Region  
7600 Sand Point Way N.E., Bldg. 1  
Seattle, Washington 98115

Refer to NMFS No:  
WCR-2015-3930

January 8, 2016

Michael S. Francis  
Chief, Environmental Compliance Section  
Walla Walla District  
Corps of Engineers  
201 North Third Ave.  
Walla Walla, Washington 99362-1876

Re: Endangered Species Act Section 7(a)(2) Concurrence and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Yakima River Gateway Project (Fifth Field HUCs: Corral Creek-Yakima River, 1703000312).

Dear Mr. Francis:

On December 28, 2015, NOAA's National Marine Fisheries Service (NMFS) received your request for a written concurrence that the United States Army Corps of Engineers' (COE's) issuance of a permit pursuant to 33 USC 408 (Section 408) to the City of West Richland (City) for modification of an existing levee, is not likely to adversely affect (NLAA) species listed as threatened or endangered under the Endangered Species Act (ESA). This response to your request was prepared by NMFS pursuant to section 7(a)(2) of the ESA, implementing regulations at 50 CFR 402, and agency guidance for preparation of letters of concurrence.

NMFS also reviewed the proposed action for potential effects on essential fish habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), including conservation measures and any determination you made regarding the potential effects of the action. This review was pursuant to section 305(b) of the MSA, implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation. In this case, NMFS concluded the action would not adversely affect EFH. Thus, consultation under the MSA is not required for this action.

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The concurrence letter will be available through NMFS' Public Consultation Tracking System (Refer to NMFS No: WCR-2015-3930). A complete record of this consultation is on file at the Columbia Basin Branch in Ellensburg, Washington.



**Consultation History**

The NMFS received a Biological Assessment and request from the COE for informal consultation, on December 28, 2015.

After discussion via telephone, NMFS received additional information from the COE via electronic mail on January 4, 2015.

**Proposed Action**

The COE proposes to issue a Section 408 permit to the City of West Richland to modify an existing levee for recreational use as part of the City's Yakima River Gateway Project. The levee is located along the west bank of the Yakima River and passes underneath the Van Giesen Bridge on State Route 224 in Benton County, WA. The COE's issuance of a Section 408 permit will be required for construction of a pedestrian access ramp, retaining wall, and trail under the bridge.

The larger project includes construction of an 1800-foot-long paved trail, a parking area with stormwater treatment facilities, bank protection, mitigation plantings, and trail amenities such as restrooms, signs, and lighting. The project will be constructed across various public and private properties.

Most construction will occur on currently paved, riprapped, or lawn areas. Six non-native trees will be removed along the shoreline and 400 native trees and shrubs will be planted. All work will be done in the dry above and landward of the Ordinary High Water Mark (OHWM) of the Yakima River. Proposed activities closest to the river consist of augmenting existing riprapped shoreline and constructing a concrete retaining wall near the bridge.

The City intends to construct the project between spring of 2016 and spring of 2017. Although no in-water work is proposed, the City intends to adhere to the standard in-water work window of August 1 to September 30 for work near the river in an effort to minimize the potential for impacts to aquatic species during construction.

**Action Area**

The action area includes the construction and staging areas, access roads, and the Yakima River from the construction area downstream for approximately 100 feet.

The Yakima River in the action area is typically used by adult Middle Columbia River (MCR) steelhead (*Oncorhynchus mykiss*) for migration from fall through spring of each year. Most juvenile steelhead migrate downstream through the action area from March through June, although migration may occur as early as January and as late as July. It is believed, but not certain, that small numbers of juvenile steelhead rear in the action area during late fall and winter. The action area is designated critical habitat for MCR steelhead.

**Action Agency's Effects Determination**

The COE determined that the proposed action is not likely to adversely affect MCR steelhead.

## ENDANGERED SPECIES ACT

### Effects of the Action

Under the ESA, “effects of the action” means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR 402.02). The applicable standard to find that a proposed action is not likely to adversely affect listed species or critical habitat is that all of the effects of the action are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.

Anticipated effects of the action include alteration of the environment in the action area during and after construction. Those effects will be caused by construction activities and subsequent use of the project for recreation.

Short-term effects of the action include increased noise during construction and erosion of sediment during and after grading. The effects of increased noise are expected to be insignificant because no noise-generating activities will occur in-water and because noise generation will be limited by avoiding the types of construction activities known to cause enough noise to adversely affect salmonids (blasting, pile driving, etc.).

The effects of erosion are expected to be insignificant because no soil-disturbing activities will occur in water, standard erosion control practices will be implemented, and the size of the grading area compared to the volume of the river creates a very high dilution potential for any sediment that may enter the river.

Potential longer-term effects of the project include those resulting from removal of shoreline vegetation and those associated with discharge of stormwater runoff from the proposed parking lot. Six trees along the shoreline will be removed during construction, decreasing shading of the river. However, the limited area of shade removal is very small relative to the width and volume of the river in the area such that the effect of reduced shading will be insignificant. While not a factor in making this effect determination, it is worth noting that the 400 trees and shrubs that will be planted by the City will mature and improve riparian function at the site over the baseline condition.

Development and use of the project will change the routing and quality of stormwater (i.e. runoff generated by local precipitation falling on impervious surfaces). Specifically, development and use of the parking area will result in stormwater runoff with higher concentrations of some pollutants than are currently generated on site. The runoff will be routed to a newly constructed stormwater treatment facility, which will remove some pollutants that are currently generated in the action area, as well as new pollutants that will be deposited in the area due to the project. Considering the development of the site, including the new treatment facility, NMFS expects that the total discharge of pollutants to the Yakima River will be approximately similar before and after implementation of the project. Any increases or decreases in pollutant discharge are expected to be so minor and so diluted in the adjacent river that effects will be insignificant.

**Conclusion**

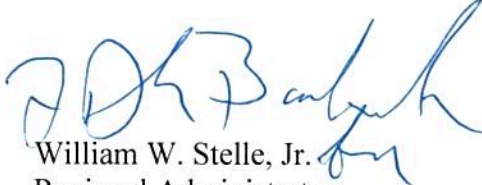
Based on this analysis, NMFS concurs with the COE that the proposed action is not likely to adversely affect MCR steelhead or their designated critical habitat.

**Reinitiation of Consultation**

Reinitiation of consultation is required and shall be requested by the COE or by NMFS, where discretionary Federal involvement or control over the action has been retained or is authorized by law and (1) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (2) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this concurrence letter; or if (3) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16). This concludes the ESA portion of this consultation.

Please direct questions regarding this letter to Sean Gross of the Columbia Basin Branch in Ellensburg, Washington at (509) 962-8911 x225 or email at [sean.gross@noaa.gov](mailto:sean.gross@noaa.gov).

Sincerely,



William W. Stelle, Jr.  
Regional Administrator

## APPENDIX C: WETLAND DELINEATION REPORT

**Yakima River Gateway Project**  
**Wetland Delineation Report**  
**Benton County, Washington**

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*Prepared for:*  
**City of West Richland**  
**and**  
**MacKay Sposito**

*Prepared by:*  
**Anderson Environmental Consulting (AEC) LLC**

February 24, 2015

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# 1 Introduction

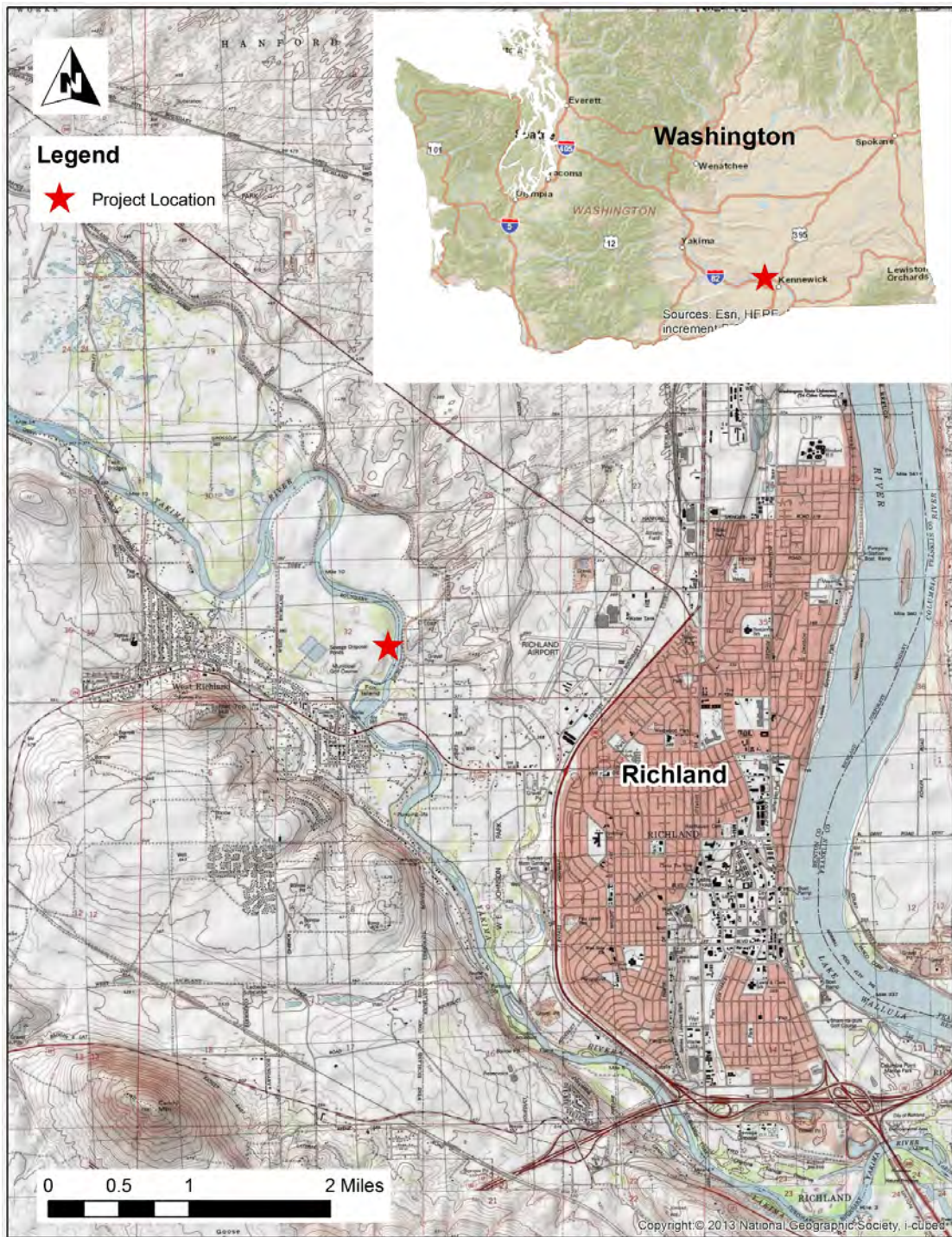
## 1.1 Project Description

The Yakima River Gateway Project will construct a multi use path from just south of the Van Geisen Bridge to the West Richland Golf Course. The project will provide parking, bathrooms, and stormwater treatment at a trailhead south of Van Geisen Bridge. The trail will extend north along the west side of the Yakima River to the south end of the golf course. There will be ADA access and accessible non-motorized river access near the bridge. The trail will be a 10 ft. to 12 ft. wide paved path with a of couple feet on clearing on either side which is dependent on topography. Along the trail there will be lighting, interpretive signage, landscaping, and lawn. Fallon Drive will be removed from vehicular traffic and access to existing homes will be provided through alley entrances. The area evaluated in this wetland delineation report is larger than the extent of the current project and extends further north along the existing berm on the east side of the West Richland Golf Course.

## 1.2 Project Location

The project is in the City of West Richland, in Benton County Washington. It follows the west bank of the Lower Yakima River. The elevation is approximately 370 ft above sea level in Township 10 North, Range 28 East, Section 32 and the northern end of Township 9 North, Range 28 East, Section 5. See Figure 1. Vicinity Map.

Figure 1. Vicinity Map



## 2 Methodology

### 2.1 Protocol

The *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) with the *Regional Supplement to the U.S. Army Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008) methods were used. The Corps of Engineers (Corps) and the State of Washington recognize the use of these methodologies for delineating wetlands in specific vegetation zones.

The technical guidance provides recommended procedures to be used for determining jurisdictional boundaries of wetlands. To be considered a wetland, hydrophytic vegetation, hydric soils, and wetland hydrology must be present under normal circumstances. Indicators to determine if this criterion is met are specified in the Corps methodology. The Corps provides additional methodology if the area has been disturbed from recent natural events or human activities or is considered a problem area.

The *Washington State Wetland Rating System for Eastern Washington – Revised* (Hruby 2008) was used to assess the project study area wetland functions and values. This rating system differentiates wetlands based on their sensitivity to disturbance, their significance, their rarity, our ability to replace them, and the functions they provide. Wetlands are given a rating from Category I to Category IV. Category I wetlands have the highest functions and values and Category IV wetlands have the lowest.

### 2.2 Background Information

Information was collected prior to field evaluation to assist with data collection and to provide information regarding the project study area. Data sources included the following:

1. Aerial photography (ESRI 2014)
2. Soil Survey Geographic (SSURGO) database for Benton County, Washington (NRCS 2014)
3. U.S. Fish and Wildlife Service National Wetland Inventory (NWI) maps (USFWS 2014)

### 2.3 Field investigation

The area that was evaluated for wetlands included the cul-de-sac south of the Van Geisen Bridge, north along the shoreline along and east of Fallon Drive, and along the raised berm that extends from the southeast corner of the golf course to the northeast of the golf course. The area approximately 50 feet from either side of the berm/proposed trail alignment was evaluated but the shoreline on the north end of the project was also surveyed. The area just east of the golf course clubhouse was also investigated to accommodate different alignment options. In areas where wetland vegetation and hydrology continued outside the 50 ft. evaluation area, the wetland boundary was extended.

The wetland was delineated by Michelle C. Anderson of Anderson Environmental Consulting LLC on October 31, November 1, November 7 and November 9 of 2014. Formal data plots were selected based on topography, hydrophytic vegetation, saturated soils and drainage patterns. Each data plot was assigned a unique number and a data form from the Arid West Region Supplement was completed for both upland and wetland plots to delineate the wetland boundaries. Wetland boundaries were recorded using resource grade gps then surveyed by MacKay Sposito. Field data was overlain on aerial photography using ArcGIS 10.2. An agency field visit that included representatives from Washington Department of Fish and Wildlife (WDFW), US Army Corps of Engineers (Corps), and Washington State Department of Ecology (Ecology), was held on January 21, 2015 to review the proposed trail and review the wetland boundary south of the golf course and the ordinary high water mark (OHWM).

## 2.4 Vegetation

Hydrophytic vegetation consists of those plant species that have adapted to growing in substrates that are periodically deficient of oxygen due to saturated soil conditions. Five basic groups of vegetation are recognized based on their frequency of occurrence in wetlands. These categories, referred to as the “wetland indicator status” (from the wettest to driest habitats) are as follows:

- obligate wetland plants (OBL)
- facultative wetland (FACW)
- facultative (FAC)
- facultative upland (FACU)
- upland plants (UPL)

Vegetative communities with dominant plants that could be considered distinctively hydrophytic or upland were used to identify the best data plots. Dominant plant species were visually estimated and recorded for each plot and for each wetland based on variably shaped communities. The wetland indicator status of each plant was determined based on the updated Corps National Wetland Plant List (USACE 2012).

Tree layers were recorded within an approximate 30-foot radius and shrub and herbaceous vegetation within an approximate 10-foot radius. The shape of the vegetative area was adjusted to best incorporate the representative community. A determination of dominance of hydrophytic vegetation was made using the 50-20 rule. Dominant plant species were determined by estimating the percentage of aerial cover per stratum. If over 50 percent of the dominant species included by the above criteria were FAC, FACW or OBL, the vegetative community was considered hydrophytic.

## 2.5 Soils

Mapped soil units were referenced and field verified in both wetland and adjacent upland areas to determine the presence of hydric soils. Hydric soils are soils formed exclusively under saturated soil conditions. Test pits were excavated and data was recorded for the soil profiles. This included determining soil colors using the Munsell (1992) color charts, investigating for redoximorphic features, reduced soils, depleted soils, organic matter, texture and positive indicators for hydric soils.

## 2.6 Hydrology

Positive hydrological field indicators were observed and recorded as applicable for each data plot. These are indicators that the site is subject to flooding, ponding or saturation for a duration that is sufficient to create anaerobic soil conditions. Hydrological indicators should be present even if the site is not currently inundated. Primary positive hydrological indicators include features such as oxidized rhizospheres, drainage patterns, saturation, high water table and drift deposits.

# 3 Affected Environment

## 3.1 Vegetation

Table 1. *Plants Identified in the Project Study Area* lists the plants identified with their wetland indicator status. The wetlands were frequently dominated by cottonwoods, silver maples, reed canarygrass, willows and red osier dogwood. Several areas along the shores of the Yakima River had aquatic species including cattail and bulrushes. The upland areas were dominated by mountain ash, rose, sagebrush, grasses and weeds. The golf course turf is dominated by Kentucky bluegrass, ryegrass, bentgrass and scattered ornamental trees.

**Table 1. Plants Identified in Project Study Area**

Scientific Name	Common Name	Arid West Wetland
<i>Acer saccharinum L</i>	Siver maple	FAC
<i>Agropyron cristatum</i>	Crested wheatgrass	UPL
<i>Agrostis stolonifera</i>	Creeping Bentgrass	FACW
<i>Alnus incana</i>	Thin leaf alder	FACW
<i>Amelanchier alnifolia</i>	Western serviceberry	FACU
<i>Apocynum androsaemifolium</i>	Spreading dogbane	UPL
<i>Artemisia tridentata</i>	Big sagebrush	UPL
<i>Bassia scoparia</i>	Kochia	FAC
<i>Betula occidentalis</i>	Water Birch	FACW
<i>Betula papyrifera</i>	Paper birch	FAC
<i>Bromus tectorum</i>	Cheatgrass	UPL
<i>Carex sp.</i>	Sedge species	FACW/OBL
<i>Cirsium arvense</i>	Canada thistle	FACU
<i>Clematis ligusticifolia</i>	Western white clematis	FAC
<i>Conium maculatum</i>	Poison hemlock	FACW
<i>Cornus alba</i>	Red-osier dogwood	FACW
<i>Cratageous douglasii</i>	Black hawthorn	FACW
<i>Echinochloa crus-galli</i>	Barnyard grass	FACW
<i>Elaeagnus angustifolia</i>	Russian olive	FAC
<i>Equisetum arvense</i>	Field horsetail	FAC
<i>Erigeron canadensis</i>	Horseweed	FACU
<i>Festuca rubra</i>	Red fescue	FAC
<i>Heracleum maximum</i>	Cow parsnip	FACW
<i>Hypericum perforatum</i>	Common St. John's-wort	FACU
<i>Lactuca serriola</i>	Prickly lettuce	FACU
<i>Lema minor</i>	Duckweed	OBL
<i>Lolium perenne</i>	Perennial ryegrass	FAC
<i>Phalaris arundinacea</i>	Reed canarygrass	FACW
<i>Plantago major</i>	Common plantain	FAC
<i>Poa pratensis</i>	Kentucky bluegrass	FAC
<i>Populus balsamifera</i>	Black cottonwood	FAC
<i>Populus nigra</i>	Lombardy poplar	UPL
<i>Prunus emarginata</i>	Bitter cherry	FACU
<i>Rhus glabra</i>	Smooth Sumac	NI
<i>Robinia pseudoacacia</i>	Black locust	FACU
<i>Rosa nutkana</i>	Nootka rose	FACU
<i>Rubus Armeniacus</i>	Blackberry	FACU
<i>Rumex crispus</i>	Curly dock	FAC
<i>Salix exigua</i>	Coyote willow	FACW
<i>Salix lasiandra</i>	Pacific willow	FACW
<i>Sambucus cerulea</i>	Blue elderberry	FAC

<i>Schoenoplectus acutus</i>	Hard-stem bulrush	OBL
<i>Solanum dulcamara</i>	Bittersweet nightshade	FAC
<i>Sorbus aucuparia</i>	European mountain-ash	UPL
<i>Spirea douglasii</i>	Spirea	FACW
<i>Symphoricarpos albus</i>	Common snowberry	FACU
<i>Taraxacum officinale</i>	Dandelion	FACU
<i>Typha latifolia</i>	Cattail	OBL
<i>Ulmus pumila</i>	Siberian elm	UPL
<i>Urtica dioica</i>	Stinging nettle	FAC
<i>Verbascum thapsus</i>	Common mullein	FACU

### 3.2 Soils

All of the soils mapped in the project area are subject to seasonal flooding and seasonally high water tables. Only Rh-Riverwash is considered hydric in the NRCS database, however, positive hydric soil indicators were present through the project area. The predominant soils on-site are PaA- Pasco Fine Sandy Loam, Pca- Pasco Silt Loam, and Rh- Riverwash. The predominant mapped soil units according to the Benton County Soil Survey (NRCS 2014) are shown in Figure 2. Soil Survey Map and described below:

Figure 2. Soil Survey Map



**PaA- Pasco Fine Sandy Loam**-has a parent material of alluvium and is typically found in floodplains. Slope is 0-2 percent and is somewhat poorly drained. The depth to the water table is about 24-36 inches and floods occasionally. The typical profile is 0-6 inches fine sandy loam, 6-60 inches silt loam. This soil does not meet the hydric soil criteria.

**PcA- Pasco Silt loam**- has a parent material of alluvium and is typically found in floodplains. Slope is 0-2 percent and is poorly drained. The depth to the water table is about 24-36 inches and floods occasionally. The typical profile is 0-6 inches silt loam and 6-60 inches silt loam. This soil does not meet hydric criteria.

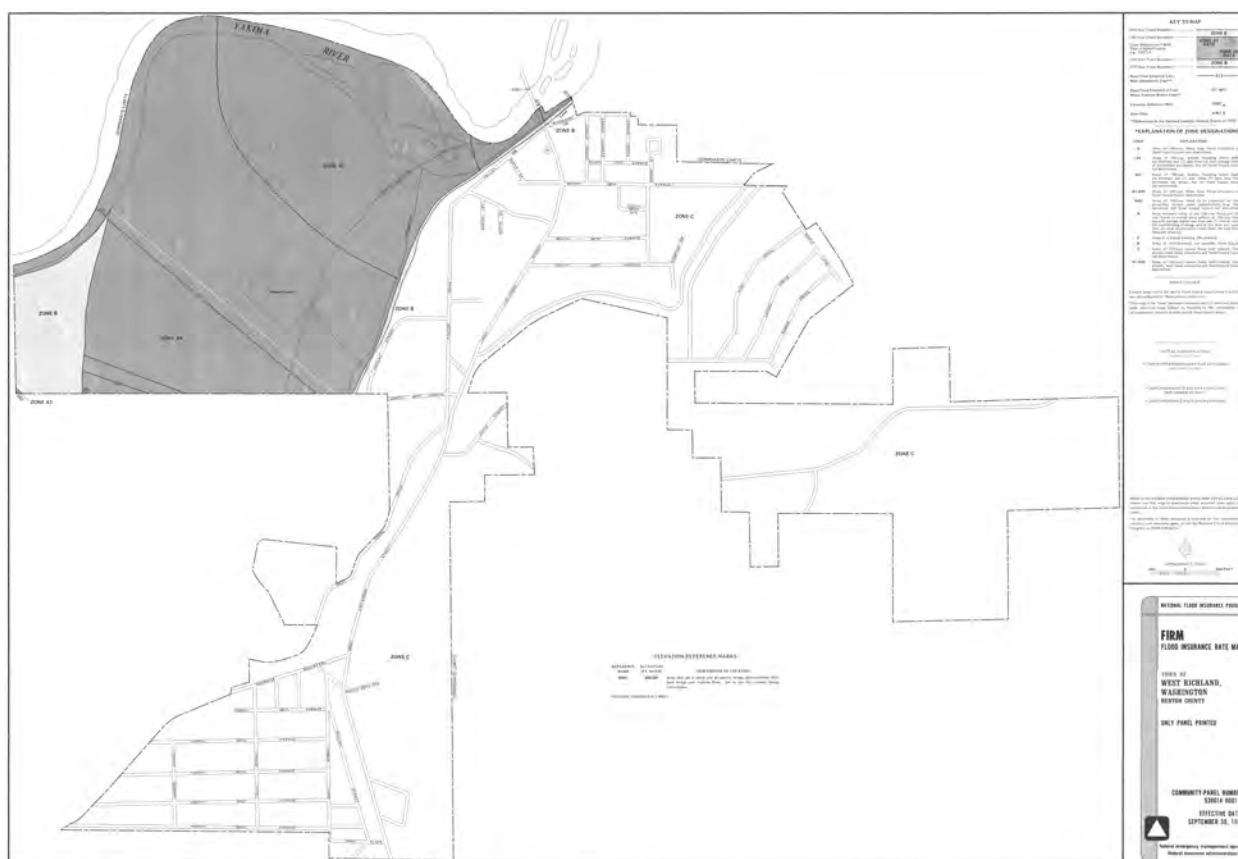
**Rh- Riverwash**- has a parent material of alluvium and is typically found on terraces. Slope is 0-3 percent. The depth to the water table is 0-24 inches and has frequent flooding. There is no typical profile listed. This soil is considered hydric.

**BbD-Burbank loam fine sand** 2-15 percent has a parent material of mixed alluvium and/or eolian deposits over gravelly and stony alluvium typically on terraces. The depth to restrictive features and water table is more than 80 inches and it is considered excessively drained. It is not frequently flooded or ponded. The typical profile is 0-5 inches of loamy fine sand, 5-16 inches of loamy sand, 16-30 inches of very gravelly loamy sand and 30-60 inches of extremely gravelly sand.

### 3.3 Hydrology

The project area is along the western riparian corridor of the Lower Yakima River, which is a tributary to the Columbia River. This reach is within WRIA 37, the Lower Yakima River Basin and is 303d listed and water quality impaired for DDT and turbidity. It supports a number of fish and wildlife species including federally listed fish species (bull trout, chinook, steelhead, coho and sockeye). The positive hydrological indicators for wetlands included surface waters, high water table, saturation, flooding visible on aerial imagery, and drift marks. All of the identified wetlands are located within the mapped 100-year floodplain. A levy constructed by the Corps is located south of the Van Geisen Bridge and extends north along Fallon Drive. An earthen berm which is reserved for a trail system along the Yakima River, continues north following the east side of the golf course. See Figure 3. Floodplain Map.

Figure 3. Floodplain Map



### 4 Wetland Findings

Three wetlands were identified and delineated within the study area and are described in this report. See Figure 4. Wetland Overview Map. This segment of the Lower Yakima River is a navigable water and jurisdictional by the Corps under Section 10 of the Rivers and Harbors Act of 1899. Any activities in wetlands are also jurisdictional by the Corps under Section 404 of the Clean Water Act; however no work in wetlands or below the OHWM is proposed at this time.



Figure 4. Wetland Overview Map



## 4.1 Wetland Characteristics

The National Wetland Inventory (NWI) indicates that there are freshwater forested, scrub/shrub and riverine wetlands in the project vicinity (USFWS 2014). See Appendix A. Wetland Delineation Data Forms for the details at each data plot. See Appendix C. Wetland Photographs for photographs of the wetlands and the project area.

### 4.1.1 Wetland



Wetland A is an approximately 49 acre riverine forested wetland that also contains areas of aquatic, emergent and scrub-shrub vegetative communities. There are extensive depressional and some upland areas interspersed in the wetland. Wetland A is dominated by silver maple, cottonwood, and thinleaf alder with an understory of red osier dogwood, coyote willow and clematis. Approximately half of Wetland A is bordered by the golf course, which is dominated by Kentucky bluegrass, ryegrass and bentgrass. Along the shoreline of the Yakima River, near Fox Island, is an aquatic plant community that includes a large areas of aquatic species including cattail and bulrush. While this area was outside of the 50 ft wetland evaluation area it was included in Wetland A because it is connected to Wetland A and there was a predominance of facultative wetland and obligate wetland species and positive hydrological indicators are present.

Wetland A soils are primarily silt loams and fine sands. The northeast end of Wetland A has a strip of riverwash. Hydric soils in wetland A were dark upper soils with redoximorphic features.

Wetland hydrology is primarily from overbank flooding during the winter and spring, and a high water table influenced by fluctuations in Yakima River water levels. The entire wetland is within the 100-year floodplain and flooding is visible on aerial imagery. The frequent flooding was confirmed by the golf course caretaker who indicated that the golf course seasonally floods leaving more than a foot of water over the course, which recedes with the river. The flooding is anticipated to be present for approximately two weeks during the spring and saturation would longer. Under the Arid West methodology, even without positive hydrological indicators, areas with hydrophytic vegetation and hydric soils may be presumed wetland in floodplains. See Figure 5. Wetland A Photos.

**Jurisdiction:** Wetland A is jurisdictional by the Corps because it abuts and is hydrologically connected to the Yakima River, a water of the US and a Section 10 Navigable Water.

**Figure 5. Wetland A Photos**

	
<p><i>Wetland A near veranda. Beaver activity present</i></p>	<p><i>Wetland A. edge of willow stands east of berm</i></p>

#### 4.1.2 Wetland

Wetland B is a 0.73 acre palustrine forested wetland located just southwest of Wetland A. It is separated from Wetland A by a manmade berm but was previously part of Wetland A. The forested component of Wetland B is dominated by cottonwood and willows. The emergent component extends north into the golf course and is dominated by reed canarygrass, Kentucky bluegrass and ryegrass. Over three-fourths of the wetland is surrounded by the golf course and the remaining southern edge abuts the road fill. The soils are dark silt loams with redoximorphic features.

The hydrology for the site is ponding and saturated soils from seasonal flooding of the Yakima River that settles in depressions and runoff from the roadway and residential areas to the south. The hydrology from Wetland B appears to primarily infiltrate into the ground but there may be some subsurface hydrological connection to Wetland A under the berm to the east. See Figure 6. Wetland B Photos.

**Jurisdiction:** Wetland B is jurisdictional by the Corps because while separated by a berm, it is likely hydrologically connected to and adjacent to Wetland A, which drains to the Yakima River, a water of the US and a Section 10 Navigable Water.

Figure 6. Wetland B Photos

	
<p><i>Wetland B, emergent species extending to golf course</i></p>	<p><i>Wetland B forested area</i></p>
	
<p><i>Wetland B in golf course</i></p>	<p><i>West end of Wetland B showing topographic dip</i></p>

### 4.1.3 Wetland

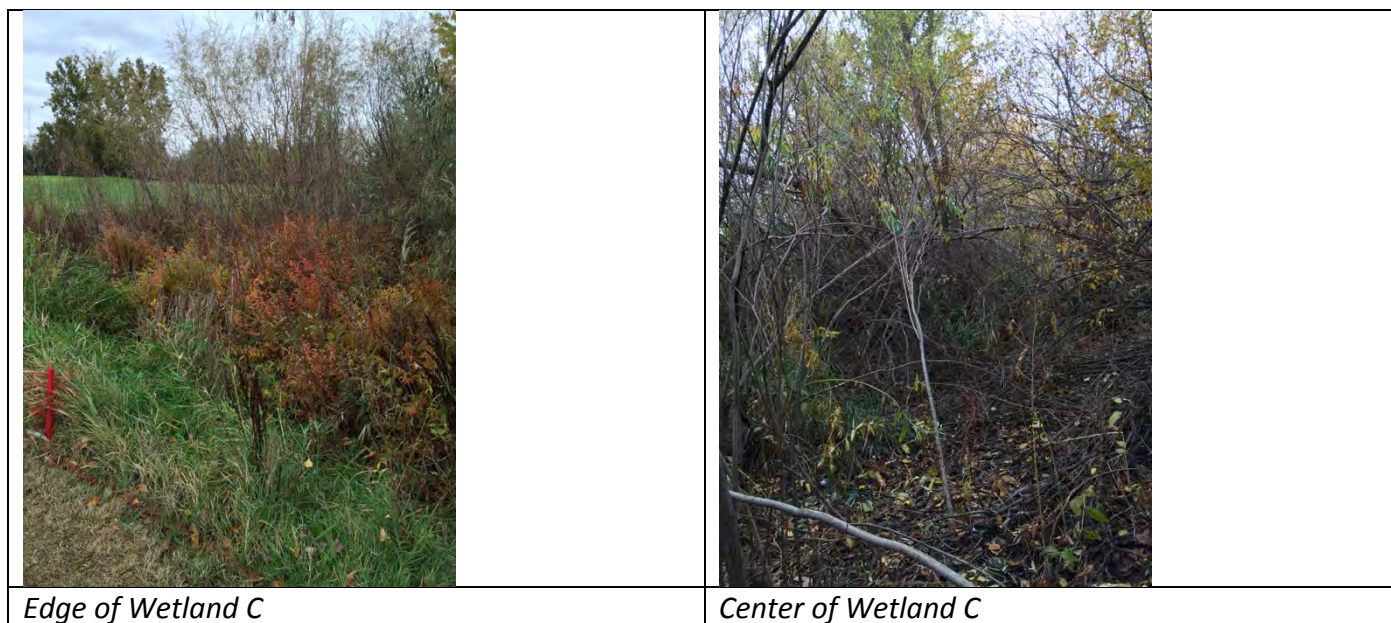
Wetland C is a 0.75 acre palustrine forested wetland located west of the north end of Wetland A. It was probably once connected to Wetland A but is now separated from Wetland A by a manmade berm. Wetland C is dominated by cottonwoods, silver maple, thinleaf alder, Russian olive, spirea, willows and reed canarygrass. Soils in the wetland are dark silt loams and sandy loams with redoximorphic features.

The hydrology for the site is primarily from overbank flooding of the Yakima River which is captured in the depression in Wetland C. High river levels also influence the water table levels. Wetland C is in the 100-year

floodplain. A ditch that runs from Wetland C outside of the evaluation areas wraps around, draining back into the study area in Wetland A at the Yakima River. See Figure 7. Wetland C Photos.

**Jurisdiction:** Wetland C is jurisdictional by the Corps because it is hydrologically connected to and Wetland A which drains to the Yakima River, a water of the US and a Section 10 Navigable Water.

**Figure 7. Wetland C Photos**



## 4.2 Wetland Function and Value Assessment

The *Washington State Wetland Rating System for Eastern Washington – Revised (Hruby 2008)* was used to assess the wetland functions and values. The wetland function and value assessment forms are included in Appendix B, Eastern Washington Wetland Rating Forms.

### 4.2.1 Wetland

Wetland A is a Category I riverine forested wetland located within the 100-year floodplain. It meets the forested floodplain special category which would categorize it as a Category II wetland but it functions as a Category I wetland based on scoring. It functions high for habitat, hydrologic functions and water quality. The wetland is bordered by local roads and residential developments on its southwest end. The West Richland Golf Course is on its west side and the Yakima River and Fox Island is on its east side. This segment of the Yakima River is 303(d) listed and water quality limited for DDT and temperature. Wetland A provides storage and treatment for runoff from the golf course and residential areas and roads before the runoff enters the Yakima River. The river supports Chinook, coho, sockeye, and bull trout, which are federally-listed species. It is also widely used by waterfowl, herons, and many other wildlife species. Wetland A has several depressions and secondary flood channels that hold floodwaters during high flows and attenuate it, which benefits downstream developments. The wetland connects and is contiguous to aquatic, emergent, scrub-shrub and forested habitat along the Yakima River and contains snags and woody debris that provide habitat.

#### 4.2.2 Wetland

Wetland B is a depression forested wetland that is a Category II wetland based on both special characteristics and its functional assessment scoring. It is separated from Wetland A by a manmade berm. Wetland B lies within the 100 year floodplain, receives floodwaters from the Yakima River. It receives road runoff and runoff from the golf course and functions high for water quality and has a constricted outlet. It functions moderately high for hydrological and habitat functions.

#### 4.2.3 Wetland

Wetland C is a Category II, depression forested wetland based on special characteristics because it is a forested wetland within a 100-year floodplain. It qualified as a Category III based on scoring. Wetland C is connected to Wetland A through a ditch that flows to the south but is separated from Wetland A to the north by a manmade berm. It is likely that before the berm was present, Wetland C was part of the functional floodplain of the Yakima River and received floodwaters more regularly. Wetland C is still within the 100-year floodplain but receives floodwaters from the Yakima River only during higher flood events due to the presence of the berm. Wetland C is bordered by the golf course on the west side and provides treatment for golf course runoff. It functions high for water quality and has a constricted outlet. It functions moderately high for hydrological and habitat functions.

### 4.3 Waters of the U.S.

The **Yakima River** is a navigable waterway and jurisdictional under Section 10 of the Rivers and Harbors Act. It is also a water of the US under the Clean Water Act. It is located adjacent to the east edge of the study area for the project.

## 5 References

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## APPENDIX A. WETLAND DELINEATION DATA FORMS

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**Legend**



Delineated Wetlands



**Wetland C**

**Wetland B**

**Wetland A**

**Yakima River**

**Fallon Drive**

**Hwy 224**


0 195 390 780 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Geomatics, Aergrid, IGN, IGP, swisstopo, and the GIS User Community. Sources: NASA, USGS, ESRI, NAIP, Washington State Orthophotail, other suppliers





**Legend**

- dataplots
-  Delineated Wetlands



Yakima River

0 37.5 75 150 Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Geomatics, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community. Sources: NASA, USGS, ESRI, NAIP, Washington State Orthophoto, other suppliers

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP1  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco Silt Loam (PcA) NWI classification: RU3BH

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Remarks: <u>downslope of no parking sign across from 265</u>					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:
1. <u>ACSA</u>	<u>5</u>	<u>yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>6</u> (A)  Total Number of Dominant Species Across All Strata: <u>6</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. <u>ULPA</u>	<u>5</u>	<u>yes</u>	<u>FAC</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
50% = <u>5</u> , 20% = <u>2</u>	_____	= Total Cover		<b>Prevalence Index worksheet:</b>  Total % Cover of: _____ Multiply by: OBL species _____ x1 = _____ FACW species _____ x2 = _____ FAC species _____ x3 = _____ FACU species _____ x4 = _____ UPL species _____ x5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: _____)				
1. <u>SAEX</u>	<u>40</u>	<u>yes</u>	<u>FACW</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
50% = <u>20</u> , 20% = <u>8</u>	_____	= Total Cover		
Herb Stratum (Plot size: _____)				
1. <u>PHAR</u>	<u>50</u>	<u>yes</u>	<u>FACW</u>	<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>CLLI</u>	<u>20</u>	<u>yes</u>	<u>FAC</u>	
3. <u>SPDO</u>	<u>10</u>	<u>no</u>	_____	
4. <u>XAST</u>	<u>10</u>	<u>no</u>	_____	
5. <u>EQAR</u>	<u>5</u>	<u>no</u>	_____	
6. <u>ECCR</u>	<u>5</u>	<u>no</u>	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
50% = <u>50</u> , 20% = <u>20</u>	_____	= Total Cover		
Woody Vine Stratum (Plot size: _____)				
1. <u>CLLI</u>	<u>15</u>	<u>yes</u>	<u>FAC</u>	
2. _____	_____	_____	_____	
50% = <u>7.5</u> , 20% = <u>3</u>	_____	= Total Cover		
% Bare Ground in Herb Stratum _____	% Cover of Biotic Crust _____			
Remarks:				

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-2	7.5 YR3/1	60	7.5YR3/2	40	C	_____	loamy sand	_____
2-15	Gley1/2.5N	95	2.5YR4/3	5	C	_____	Fine sand	oxydized rhisosphere
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input checked="" type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b>	<b>Hydric Soils Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Type: _____	
Depth (Inches): _____	

Remarks:

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>		
Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Water Marks (B1) (Riverine)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input checked="" type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>		<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Surface Water Present?    Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth (inches): <u>11</u>	
Water Table Present?      Yes <input type="checkbox"/> No <input type="checkbox"/>	Depth (inches): _____	
Saturation Present? (includes capillary fringe)    Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth (inches): <u>4</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 6' to water edge



## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP2  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Burbank loamy fine sand NWI classification: RU3BH  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>		
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>		Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Remarks: <u>upland bench appx 25' from waterline below rock/riprap fill</u>					

**VEGETATION – Use scientific names of plants.**

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test Worksheet:</b>	
1. <u>ACSA</u>	<u>40</u>	<u>yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC:	<u>4</u> (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata:	<u>5</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC:	<u>80</u> (A/B)
4. _____	_____	_____	_____		
50% = <u>20</u> , 20% = <u>8</u>	_____	= Total Cover			
Sapling/Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Prevalence Index worksheet:</b>	
1. <u>SAEX</u>	<u>25</u>	<u>yes</u>	<u>FACW</u>	Total % Cover of:	Multiply by:
2. <u>APAN</u>	<u>10</u>	<u>yes</u>	<u>UPL</u>	OBL species _____	x1 = _____
3. _____	_____	_____	_____	FACW species _____	x2 = _____
4. _____	_____	_____	_____	FAC species _____	x3 = _____
5. _____	_____	_____	_____	FACU species _____	x4 = _____
50% = <u>17.5</u> , 20% = <u>7</u>	_____	= Total Cover		UPL species _____	x5 = _____
Herb Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Column Totals: _____ (A)	_____ (B)
1. <u>LOPI</u>	<u>55</u>	<u>yes</u>	<u>FAC</u>	Prevalence Index = B/A = _____	
2. <u>PHAR</u>	<u>25</u>	<u>yes</u>	<u>FACW</u>	<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)	
3. <u>BRIN</u>	<u>20</u>	<u>no</u>	_____		
4. <u>RHCR</u>	<u>5</u>	<u>no</u>	_____		
5. <u>LASE</u>	<u>5</u>	<u>no</u>	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
50% = <u>55</u> , 20% = <u>22</u>	_____	= Total Cover			
Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
1. <u>Q</u>	_____	_____	_____		
2. _____	_____	_____	_____		
50% = _____, 20% = _____	_____	= Total Cover		<b>Hydrophytic Vegetation Present?</b>	
% Bare Ground in Herb Stratum _____	% Cover of Biotic Crust _____				

Remarks: \_\_\_\_\_

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-13	10YR4/3	_____	_____	_____	_____	_____	f sand loam	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b> Type: _____ Depth (Inches): _____	<b>Hydric Soils Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
--	--

Remarks:

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Water Marks (B1) (Riverine)
	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
	<input type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Crayfish Burrows (C8)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Shallow Aquitard (D3)
	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Surface Water Present?      Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____	
Water Table Present?      Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe)      Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 6' to water edge

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP3  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): 0-10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Burbank loamy fine sand NWI classification: RU3BH  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Remarks: <u>Mid slope appx 15 ft from water flow</u>					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test Worksheet:</b>	
1. <u>ACGL</u>	<u>10</u>	<u>yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC:	<u>1</u> (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata:	<u>1</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC:	<u>100</u> (A/B)
4. _____	_____	_____	_____		
50% = <u>5</u> , 20% = <u>2</u>	_____	= Total Cover			
<b>Sapling/Shrub Stratum (Plot size: _____)</b>				<b>Prevalence Index worksheet:</b>	
1. <u>ACGL</u>	<u>10</u>	<u>yes</u>	<u>FAC</u>	Total % Cover of:	Multiply by:
2. _____	_____	_____	_____	OBL species _____	x1 = _____
3. _____	_____	_____	_____	FACW species _____	x2 = _____
4. _____	_____	_____	_____	FAC species _____	x3 = _____
5. _____	_____	_____	_____	FACU species _____	x4 = _____
50% = <u>5</u> , 20% = <u>2</u>	_____	= Total Cover		UPL species _____	x5 = _____
<b>Herb Stratum (Plot size: _____)</b>				Column Totals: _____ (A)	_____ (B)
1. <u>PHAR</u>	<u>90</u>	<u>yes</u>	<u>FACW</u>	Prevalence Index = B/A = _____	
2. <u>Carex sp.</u>	<u>10</u>	<u>no</u>	_____	<b>Hydrophytic Vegetation Indicators:</b>	
3. _____	_____	_____	_____	<input checked="" type="checkbox"/> Dominance Test is >50%	
4. _____	_____	_____	_____	<input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup>	
5. _____	_____	_____	_____	<input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)	
6. _____	_____	_____	_____	<input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)	
7. _____	_____	_____	_____	<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
8. _____	_____	_____	_____		
50% = <u>50</u> , 20% = <u>20</u>	_____	= Total Cover			
<b>Woody Vine Stratum (Plot size: _____)</b>				<b>Hydrophytic Vegetation Present?</b>	
1. _____	_____	_____	_____	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
2. _____	_____	_____	_____		
50% = _____, 20% = _____	_____	= Total Cover			
% Bare Ground in Herb Stratum _____				% Cover of Biotic Crust _____	
Remarks: <u>disturbed area near beaver dam and gazebo</u>					

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-11	10YR3/2	100	_____	_____	_____	_____	fsl	_____
11-13	10YR4/2	98	7.5YR3/3	2	C	M	fsl	faint
13-19	Gley1 3104	20	_____	_____	_____	_____	_____	_____
_____	10YR4/2	60	7.5YR4/6	10	C	PL	sl	root pores
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input checked="" type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b> Type: _____ Depth (Inches): _____	<b>Hydric Soils Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Remarks:

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input checked="" type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Water Marks (B1) (Riverine)
	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
	<input checked="" type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Crayfish Burrows (C8)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Shallow Aquitard (D3)
	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe)    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: appx 10' from floodpalin. floods in spring.

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP4  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): 0-10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Burbank loamy fine sand NWI classification: RU3BH

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Remarks: <u>appx 30' n. of gazebo</u>					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:	
1. <u>Salix</u>	<u>10</u>	<u>yes</u>	<u>FACW</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)	
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata: <u>4</u> (B)	
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50</u> (A/B)	
4. _____	_____	_____	_____		
50% = <u>5</u> , 20% = <u>2</u>	_____	= Total Cover			
Sapling/Shrub Stratum (Plot size: _____)				<b>Prevalence Index worksheet:</b>	
1. <u>RHGL</u>	<u>15</u>	<u>yes</u>	<u>NL (UPL)</u>	Total % Cover of :                      Multiply by:	
2. _____	_____	_____	_____	OBL species <u>0</u> x1 = <u>0</u>	
3. _____	_____	_____	_____	FACW species <u>10</u> x2 = <u>20</u>	
4. _____	_____	_____	_____	FAC species <u>50</u> x3 = <u>150</u>	
5. _____	_____	_____	_____	FACU species <u>25</u> x4 = <u>100</u>	
50% = <u>7.5</u> , 20% = <u>3</u>	_____	= Total Cover		UPL species <u>25</u> x5 = <u>125</u>	
Herb Stratum (Plot size: _____)				Column Totals: <u>110</u> (A) <u>505</u> (B)	
1. <u>POPR</u>	<u>50</u>	<u>yes</u>	<u>FAC</u>	Prevalence Index = B/A = <u>4.59</u>	
2. <u>TAOF</u>	<u>25</u>	<u>yes</u>	<u>FACU</u>	<b>Hydrophytic Vegetation Indicators:</b>	
3. <u>Iris</u>	<u>10</u>	<u>no</u>	<u>NL (UPL)</u>		<input type="checkbox"/> Dominance Test is >50%
4. <u>COAL</u>	<u>10</u>	<u>no</u>	_____		<input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup>
5. _____	_____	_____	_____		<input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
6. _____	_____	_____	_____		<input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
50% = <u>47.5</u> , 20% = <u>19</u>	_____	= Total Cover			
Woody Vine Stratum (Plot size: _____)				<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
1. _____	_____	_____	_____	<b>Hydrophytic Vegetation Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
2. _____	_____	_____	_____		
50% = _____, 20% = _____	_____	= Total Cover			
% Bare Ground in Herb Stratum _____		% Cover of Biotic Crust _____			
Remarks: <u>weedy</u>					

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-10	10YR3/3	100	_____	_____	_____	_____	f sandy	_____
11-15	10YR4/2	100	_____	_____	_____	_____	loam ashy fine light	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (LRR C)
- 1 cm Muck (A9) (LRR D)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Vernal Pools (F9)

**Indicators for Problematic Hydric Soils<sup>3</sup>:**

- 1 cm Muck (A9) (LRR C)
- 2 cm Muck (A10) (LRR B)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: \_\_\_\_\_  
 Depth (Inches): \_\_\_\_\_

**Hydric Soils Present?** Yes  No

Remarks:

**HYDROLOGY**

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1) (Nonriverine)
- Sediment Deposits (B2) (Nonriverine)
- Drift Deposits (B3) (Nonriverine)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery (B7)
- Water-Stained Leaves (B9)
- Salt Crust (B11)
- Biotic Crust (B12)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Tilled Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- Water Marks (B1) (Riverine)
- Sediment Deposits (B2) (Riverine)
- Drift Deposits (B3) (Riverine)
- Drainage Patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

**Field Observations:**

Surface Water Present? Yes  No  Depth (inches): \_\_\_\_\_  
 Water Table Present? Yes  No  Depth (inches): \_\_\_\_\_  
 Saturation Present? (includes capillary fringe) Yes  No  Depth (inches): \_\_\_\_\_

**Wetland Hydrology Present?** Yes  No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP5  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco silt loam NWI classification: RU3BH  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Remarks: <u>inside of gully and north of utility pole</u>					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:
1. <u>ROPS</u>	<u>30</u>	<u>yes</u>	<u>FACU</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)  Total Number of Dominant Species Across All Strata: <u>8</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>38</u> (A/B)
2. <u>POBA</u>	<u>20</u>	<u>yes</u>	<u>FAC</u>	
3. <u>SA</u>	<u>10</u>	<u>no</u>	_____	
4. _____	_____	_____	_____	
50% = <u>30</u> , 20% = <u>12</u>	<u>60</u>	= Total Cover		<b>Prevalence Index worksheet:</b>  Total % Cover of : _____ Multiply by: OBL species _____ x1 = _____ FACW species _____ x2 = _____ FAC species _____ x3 = _____ FACU species _____ x4 = _____ UPL species _____ x5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<b>Sapling/Shrub Stratum (Plot size: _____)</b>				
1. <u>RHGL</u>	<u>40</u>	<u>yes</u>	<u>NL (UPL)</u>	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
50% = <u>20</u> , 20% = <u>8</u>	<u>40</u>	= Total Cover		
<b>Herb Stratum (Plot size: _____)</b>				
1. <u>BASC</u>	<u>40</u>	<u>yes</u>	<u>FAC</u>	<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>CLLI</u>	<u>30</u>	<u>yes</u>	<u>FAC</u>	
3. <u>Lomatium</u>	<u>25</u>	<u>yes</u>	<u>NL (UPL)</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
50% = <u>47.5</u> , 20% = <u>18</u>	<u>95</u>	= Total Cover		
<b>Woody Vine Stratum (Plot size: _____)</b>				
1. <u>RUAR</u>	<u>60</u>	<u>yes</u>	<u>FACU</u>	<b>Hydrophytic Vegetation Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
2. <u>CLLI</u>	<u>20</u>	<u>yes</u>	_____	
50% = <u>40</u> , 20% = <u>16</u>	<u>80</u>	= Total Cover		
% Bare Ground in Herb Stratum _____	% Cover of Biotic Crust _____			
Remarks:				

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-14	10YR4/4	100	_____	_____	_____	_____	sandy loam	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b>	<b>Hydric Soils Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Type: _____	
Depth (Inches): _____	

Remarks: \_\_\_\_\_

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Water Marks (B1) (Riverine)
	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
	<input type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Crayfish Burrows (C8)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Shallow Aquitard (D3)
	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Surface Water Present?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Water Table Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe)    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: \_\_\_\_\_

Remarks: \_\_\_\_\_



## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP6  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco silt loam NWI classification: RU3BH

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Remarks:					

**VEGETATION – Use scientific names of plants.**

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:
1. <u>ULPU</u>	<u>30</u>	<u>yes</u>	<u>UPL</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)
2. <u>POBA</u>	<u>25</u>	<u>yes</u>	<u>FAC</u>	Total Number of Dominant Species Across All Strata: <u>4</u> (B)
3. <u>ACGL</u>	<u>5</u>	<u>no</u>	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>75</u> (A/B)
4. _____	_____	_____	_____	
50% = <u>30</u> , 20% = <u>12</u>	<u>60</u>	= Total Cover		
<b>Sapling/Shrub Stratum (Plot size: _____)</b>				
1. <u>COAL</u>	<u>80</u>	<u>yes</u>	<u>FACW</u>	<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: OBL species _____ x1 = _____ FACW species _____ x2 = _____ FAC species _____ x3 = _____ FACU species _____ x4 = _____ UPL species _____ x5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
50% = <u>40</u> , 20% = <u>16</u>	<u>80</u>	= Total Cover		
<b>Herb Stratum (Plot size: _____)</b>				
1. _____	_____	_____	_____	<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
50% = _____, 20% = _____	_____	= Total Cover		
<b>Woody Vine Stratum (Plot size: _____)</b>				
1. <u>CLLI</u>	<u>10</u>	<u>yes</u>	<u>FAC</u>	<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
2. _____	_____	_____	_____	
50% = <u>5</u> , 20% = <u>2</u>	<u>10</u>	= Total Cover		
% Bare Ground in Herb Stratum _____	% Cover of Biotic Crust _____			
Remarks:				

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-11	7.5YR2.5/2	95	10YR3/2	20	C	M	silt	faint contrast
11-16	10YR2/2	90	10YR3/2	10	C	M	silt	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input checked="" type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b> Type: _____ Depth (Inches): _____	<b>Hydric Soils Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks: _____	

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input checked="" type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input checked="" type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)
<input checked="" type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Water Marks (B1) (Riverine)
	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
	<input checked="" type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Crayfish Burrows (C8)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Shallow Aquitard (D3)
	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe)    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: field indicator for hydrology are faint

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP7  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco silt loam NWI classification: RU3BH  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Remarks:					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:
1. <u>POBA</u>	<u>80</u>	<u>yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)  Total Number of Dominant Species Across All Strata: <u>3</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. <u>SOAQ</u>	<u>10</u>	<u>no</u>	_____	
3. <u>SALA</u>	<u>10</u>	<u>no</u>	_____	
4. _____	_____	_____	_____	
50% = <u>50</u> , 20% = <u>20</u>	<u>100</u>	= Total Cover		<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: OBL species _____ x1 = _____ FACW species _____ x2 = _____ FAC species _____ x3 = _____ FACU species _____ x4 = _____ UPL species _____ x5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<b>Sapling/Shrub Stratum (Plot size: _____)</b> 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 50% = _____, 20% = _____ = Total Cover				
<b>Herb Stratum (Plot size: _____)</b> 1. <u>EQAR</u> <u>70</u> <u>yes</u> <u>FAC</u> 2. <u>CAOB</u> <u>20</u> <u>yes</u> <u>FACW</u> 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 50% = <u>45</u> , 20% = <u>18</u> <u>90</u> = Total Cover				
<b>Woody Vine Stratum (Plot size: _____)</b> 1. _____ 2. _____ 50% = _____, 20% = _____ = Total Cover % Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				
<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)				
<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
Remarks:				

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-4	10YR2/2	100					f silt loam	
4-13	5Y2.5/1	90	10YR2/1	10	C		f silt loam	
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input checked="" type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b> Type: _____ Depth (Inches): _____	<b>Hydric Soils Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Remarks:

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>		
Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input checked="" type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Water Marks (B1) (Riverine)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	
Surface Water Present?      Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Water Table Present?      Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>7</u>	
Saturation Present? (includes capillary fringe)      Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>8</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Appx 5' to standing water

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP8  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco silt loam NWI classification: RU3BH

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Remarks:					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test Worksheet:</b>			
1. <u>POBA</u>	<u>25</u>	<u>yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC:	<u>5</u> (A)		
2. <u>SALA</u>	<u>20</u>	<u>yes</u>	<u>FACW</u>	Total Number of Dominant Species Across All Strata:	<u>5</u> (B)		
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC:	<u>100</u> (A/B)		
4. _____	_____	_____	_____				
50% = <u>22.5</u> , 20% = <u>9</u>	<u>45</u>	= Total Cover					
Sapling/Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Prevalence Index worksheet:</b>			
1. <u>SAEX</u>	<u>40</u>	<u>yes</u>	<u>FACW</u>	Total % Cover of:	Multiply by:		
2. <u>SOAU</u>	<u>5</u>	<u>no</u>	_____	OBL species _____	x1 = _____		
3. _____	_____	_____	_____	FACW species _____	x2 = _____		
4. _____	_____	_____	_____	FAC species _____	x3 = _____		
5. _____	_____	_____	_____	FACU species _____	x4 = _____		
50% = <u>22.5</u> , 20% = <u>9</u>	<u>45</u>	= Total Cover		UPL species _____	x5 = _____		
Herb Stratum (Plot size: _____)				Column Totals: _____ (A)	_____ (B)		
1. <u>PHAR</u>	<u>50</u>	<u>yes</u>	<u>FACW</u>	Prevalence Index = B/A = _____			
2. <u>POPR</u>	<u>50</u>	<u>yes</u>	<u>FAC</u>	<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)			
3. _____	_____	_____	_____				
4. _____	_____	_____	_____				
5. _____	_____	_____	_____				
6. _____	_____	_____	_____				
7. _____	_____	_____	_____				
8. _____	_____	_____	_____				
50% = <u>50</u> , 20% = <u>20</u>	<u>100</u>	= Total Cover					
Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Hydrophytic Vegetation Present?</b>			
1. _____	_____	_____	_____			Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
2. _____	_____	_____	_____				
50% = _____, 20% = _____	_____	= Total Cover					
% Bare Ground in Herb Stratum _____	_____	% Cover of Biotic Crust _____					
Remarks:							

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-8	2.5Y3/2	100					silt	brown with grey
8-14	2.5Y3/2		10YR3/6	5	C	M	silt loam	some fine sand/rust
			2.5YR4/6	10	D	M		

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input checked="" type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b>	<b>Hydric Soils Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Type: _____	
Depth (Inches): _____	

Remarks:

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Water Marks (B1) (Riverine)
	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
	<input type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Crayfish Burrows (C8)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Shallow Aquitard (D3)
	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Surface Water Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): <u>1</u>	
Water Table Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe)      Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>10"</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: standing water at same elevation appx 15' towards trail.

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP9  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco silt loam NWI classification: RU3BH  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Remarks:					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:
1. <u>POBA</u>	<u>30</u>	<u>yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)  Total Number of Dominant Species Across All Strata: <u>4</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50</u> (A/B)
2. <u>SOAU</u>	<u>10</u>	<u>yes</u>	<u>UPL</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
50% = <u>20</u> , 20% = <u>8</u>	<u>40</u>	= Total Cover		<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: OBL species _____ x1 = _____ FACW species _____ x2 = _____ FAC species _____ x3 = _____ FACU species _____ x4 = _____ UPL species _____ x5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<b>Sapling/Shrub Stratum (Plot size: _____)</b> 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 50% = _____, 20% = _____ = Total Cover				
<b>Herb Stratum (Plot size: _____)</b> 1. <u>LOPE</u> <u>50</u> <u>yes</u> <u>FAC</u> 2. <u>CIAR</u> <u>30</u> <u>yes</u> <u>FACU</u> 3. <u>PHAR</u> <u>10</u> <u>no</u> <u>FACW</u> 4. <u>EQAR</u> <u>10</u> <u>no</u> <u>FAC</u> 5. <u>ERCA</u> <u>5</u> <u>no</u> <u>FACU</u> 6. _____ 7. _____ 8. _____ 50% = <u>52.5</u> , 20% = <u>21</u> = Total Cover				
<b>Woody Vine Stratum (Plot size: _____)</b> 1. _____ 2. _____ 50% = _____, 20% = _____ = Total Cover				
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				
Remarks:				

**Hydrophytic Vegetation Present?** Yes  No

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-10	2.5Y3/3	100	_____	_____	_____	_____	f silt loam	_____
10-18	2.5Y3/2	100	_____	_____	_____	_____	f silt loam	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)		

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b> Type: _____ Depth (Inches): _____	<b>Hydric Soils Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
--	--

Remarks: \_\_\_\_\_

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Water Marks (B1) (Riverine)
	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
	<input type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Crayfish Burrows (C8)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Shallow Aquitard (D3)
	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Surface Water Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Water Table Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe)      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Note: per regular player whole course floods in march with ankle deep in water. DP is offset appx 2' to wetland



## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP11  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco silt loam NWI classification: RU3BH  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>				
Remarks:						

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:
1. <u>ACSA</u>	<u>80</u>	<u>yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)  Total Number of Dominant Species Across All Strata: <u>4</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>75</u> (A/B)
2. <u>ALIN</u>	<u>20</u>	<u>yes</u>	<u>FACW</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
50% = <u>50</u> , 20% = <u>20</u>	<u>100</u>	= Total Cover		<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: OBL species _____ x1 = _____ FACW species _____ x2 = _____ FAC species _____ x3 = _____ FACU species _____ x4 = _____ UPL species _____ x5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
<b>Sapling/Shrub Stratum (Plot size: _____)</b> 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 50% = _____, 20% = _____ = Total Cover				
<b>Herb Stratum (Plot size: _____)</b> 1. <u>APAN</u> 5 <u>yes</u> <u>UPL</u> 2. <u>PHAR</u> 5 <u>yes</u> <u>FACW</u> 3. <u>oxalis spp</u> 2 <u>no</u> _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 50% = <u>7.5</u> , 20% = <u>3</u> = Total Cover				
<b>Woody Vine Stratum (Plot size: _____)</b> 1. _____ 2. _____ 50% = _____, 20% = _____ = Total Cover				
<b>% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____</b>				
Remarks: <u>lots of leaf cover</u>				

**Hydrophytic Vegetation Present?** Yes  No

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-5	10YR3/1	90	10YR2/1	10	C	M	silt loam	black streaks
5-15	2.5Y4/2	98	2.5YR5/8	5	C	M	silt loam	redox & light spots
_____	_____	_____	gley1 8/104	2	C	M	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input checked="" type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)		

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b> Type: _____ Depth (Inches): _____	<b>Hydric Soils Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Remarks:	

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water Marks (B1) (Riverine)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Salt Crust (B11)	
<input type="checkbox"/> Biotic Crust (B12)	
<input type="checkbox"/> Aquatic Invertebrates (B13)	
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	
<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	
<input type="checkbox"/> Presence of Reduced Iron (C4)	
<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	
<input type="checkbox"/> Thin Muck Surface (C7)	
<input type="checkbox"/> Other (Explain in Remarks)	

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Surface Water Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Water Table Present?      Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>14</u>	
Saturation Present? (includes capillary fringe)      Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>10</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP12  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco silt loam NWI classification: RU3BH  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>				
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>				
Remarks:						

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:	
1. <u>ACSA</u>	<u>40</u>	<u>yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC:	<u>2</u> (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata:	<u>4</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC:	<u>50</u> (A/B)
4. _____	_____	_____	_____		
50% = <u>20</u> , 20% = <u>8</u>	<u>40</u>	= Total Cover			
Sapling/Shrub Stratum (Plot size: _____)				Prevalence Index worksheet:	
1. <u>RONU</u>	<u>50</u>	<u>yes</u>	<u>FACU</u>	Total % Cover of: _____ Multiply by: _____	
2. _____	_____	_____	_____	OBL species _____	x1 = _____
3. _____	_____	_____	_____	FACW species _____	x2 = _____
4. _____	_____	_____	_____	FAC species _____	x3 = _____
5. _____	_____	_____	_____	FACU species _____	x4 = _____
50% = <u>25</u> , 20% = <u>10</u>	<u>50</u>	= Total Cover		UPL species _____	x5 = _____
Herb Stratum (Plot size: _____)				Column Totals: _____ (A) _____ (B)	
1. <u>FERU</u>	<u>50</u>	<u>yes</u>	<u>FAC</u>	Prevalence Index = B/A = _____	
2. <u>COMA</u>	<u>20</u>	<u>no</u>	<u>FACW</u>		
3. <u>CIAR</u>	<u>30</u>	<u>yes</u>	<u>FACU</u>		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
50% = <u>50</u> , 20% = <u>20</u>	<u>100</u>	= Total Cover			
Woody Vine Stratum (Plot size: _____)				<b>Hydrophytic Vegetation Indicators:</b> <input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
50% = _____, 20% = _____	_____	= Total Cover			
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				<b>Hydrophytic Vegetation Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	
Remarks:					

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-16	10YR3/3	100	_____	_____	_____	_____	f sand loam	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)		

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b>	<b>Hydric Soils Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Type: _____	
Depth (Inches): _____	

Remarks:

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water Marks (B1) (Riverine)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Salt Crust (B11)	
<input type="checkbox"/> Biotic Crust (B12)	
<input type="checkbox"/> Aquatic Invertebrates (B13)	
<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	
<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	
<input type="checkbox"/> Presence of Reduced Iron (C4)	
<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	
<input type="checkbox"/> Thin Muck Surface (C7)	
<input type="checkbox"/> Other (Explain in Remarks)	

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Surface Water Present?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Water Table Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe)    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP13  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco silt loam NWI classification: RU3BH

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Remarks:					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:	
1. <u>ACSA</u>	<u>60</u>	<u>yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>1</u> (A)	
2. <u>SALA</u>	<u>10</u>	<u>no</u>	_____	Total Number of Dominant Species Across All Strata: <u>3</u> (B)	
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>33</u> (A/B)	
4. _____	_____	_____	_____		
50% = <u>35</u> , 20% = <u>14</u>	_____	= Total Cover			
<u>Sapling/Shrub Stratum (Plot size: _____)</u>					
1. <u>RONU</u>	<u>40</u>	<u>yes</u>	<u>FACU</u>	<b>Prevalence Index worksheet:</b>	
2. _____	_____	_____	_____		Total % Cover of: _____ Multiply by: _____
3. _____	_____	_____	_____		OBL species _____ x1 = _____
4. _____	_____	_____	_____		FACW species _____ x2 = _____
5. _____	_____	_____	_____		FAC species _____ x3 = _____
50% = <u>20</u> , 20% = <u>8</u>	_____	= Total Cover		FACU species _____ x4 = _____	
<u>Herb Stratum (Plot size: _____)</u>					
1. <u>ARTR</u>	<u>60</u>	<u>yes</u>	<u>UPL</u>	UPL species _____ x5 = _____	
2. <u>SYAL</u>	<u>5</u>	<u>no</u>	_____	Column Totals: _____ (A) _____ (B)	
3. <u>COMA</u>	<u>1</u>	<u>no</u>	_____	Prevalence Index = B/A = _____	
4. _____	_____	_____	_____	<b>Hydrophytic Vegetation Indicators:</b>	
5. _____	_____	_____	_____		<input type="checkbox"/> Dominance Test is >50%
6. _____	_____	_____	_____		<input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup>
7. _____	_____	_____	_____		<input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)
8. _____	_____	_____	_____	<input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)	
50% = <u>33</u> , 20% = <u>13.2</u>	_____	= Total Cover		<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
<u>Woody Vine Stratum (Plot size: _____)</u>					
1. _____	_____	_____	_____	<b>Hydrophytic Vegetation Present?</b>	
2. _____	_____	_____	_____		Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
50% = _____, 20% = _____	_____	= Total Cover			
% Bare Ground in Herb Stratum _____	% Cover of Biotic Crust _____				
Remarks:					

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-14	10YR2/2	100	_____	_____	_____	_____	sandy loam	very faint redox
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b>	<b>Hydric Soils Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Type: _____	
Depth (Inches): _____	

Remarks:

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>		
Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Water Marks (B1) (Riverine)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>		<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Surface Water Present?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): _____	
Water Table Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): _____	
Saturation Present? (includes capillary fringe)    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP14  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Riverwash NWI classification: RU3BH  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Remarks:					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A)  Total Number of Dominant Species Across All Strata: <u>2</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
50% = _____, 20% = _____	_____	= Total Cover		<b>Prevalence Index worksheet:</b>  Total % Cover of: _____ Multiply by: OBL species _____ x1 = _____ FACW species _____ x2 = _____ FAC species _____ x3 = _____ FACU species _____ x4 = _____ UPL species _____ x5 = _____  Column Totals: _____ (A) _____ (B)  Prevalence Index = B/A = _____
<b>Sapling/Shrub Stratum (Plot size: _____)</b> 1. <u>SAEX</u> <u>70</u> <u>yes</u> <u>FACW</u> 2. _____ _____ _____ _____ 3. _____ _____ _____ _____ 4. _____ _____ _____ _____ 5. _____ _____ _____ _____ 50% = <u>35</u> , 20% = <u>14</u> <u>70</u> = Total Cover				
<b>Herb Stratum (Plot size: _____)</b> 1. <u>LOPE</u> <u>75</u> <u>yes</u> <u>FAC</u> 2. <u>BRTE</u> <u>10</u> <u>no</u> _____ 3. _____ _____ _____ _____ 4. _____ _____ _____ _____ 5. _____ _____ _____ _____ 6. _____ _____ _____ _____ 7. _____ _____ _____ _____ 8. _____ _____ _____ _____ 50% = <u>42.5</u> , 20% = <u>17</u> <u>85</u> = Total Cover				
<b>Woody Vine Stratum (Plot size: _____)</b> 1. _____ _____ _____ _____ 2. _____ _____ _____ _____ 50% = _____, 20% = _____ _____ = Total Cover % Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				
<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.				
<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>				
Remarks:				

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-2	2.5Y3/2	100					sandy loam	
2-11	2.5Y3/3	95	2.5YR6/8	5	C	M	f sand loam	lots redox, cobbles
rock								wat

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input checked="" type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input checked="" type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b>	<b>Hydric Soils Present?</b>
Type: <u>rock</u>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Depth (Inches): <u>11</u>	

Remarks:

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water Marks (B1) (Riverine)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input checked="" type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input checked="" type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b>
Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: water table seems to fluctuate at around 4".



## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 11/1/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP15  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco fine sandy loam NWI classification: RU3BH  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Remarks: <u>just south of concrete culvert that is laying on ground.</u>					

**VEGETATION – Use scientific names of plants.**

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:
1. <u>ALIN</u>	<u>25</u>	<u>yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)  Total Number of Dominant Species Across All Strata: <u>6</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>50</u> (A/B)
2. <u>PONI</u>	<u>10</u>	<u>yes</u>	<u>UPL</u>	
3. <u>POBA</u>	<u>10</u>	<u>yes</u>	<u>FAC</u>	
4. _____	_____	_____	_____	
50% = <u>22.5</u> , 20% = <u>9</u>				
50% = <u>45</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Prevalence Index worksheet:
1. <u>SAEX</u>	<u>30</u>	<u>yes</u>	<u>FACW</u>	Total % Cover of : OBL species _____ x1 = _____ FACW species _____ x2 = _____ FAC species _____ x3 = _____ FACU species _____ x4 = _____ UPL species _____ x5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
2. <u>RONU</u>	<u>50</u>	<u>yes</u>	<u>FACU</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
50% = <u>40</u> , 20% = <u>8</u>				
50% = <u>80</u> = Total Cover				
Herb Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Indicators:
1. <u>AGCR</u>	<u>40</u>	<u>yes</u>	<u>UPL</u>	<input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>BRTE</u>	<u>30</u>	<u>yes</u>	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
50% = <u>35</u> , 20% = <u>14</u>				
50% = <u>70</u> = Total Cover				
Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Hydrophytic Vegetation Present?
1. _____	_____	_____	_____	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
2. _____	_____	_____	_____	
50% = _____, 20% = _____				
50% = _____ = Total Cover				
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				
Remarks:				

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-14	10YR2/2	100	_____	_____	_____	_____	sandy loam	no redox
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)	
<input type="checkbox"/> Sandy Gleyed Matrix (S4)		

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b>	<b>Hydric Soils Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Type: _____	
Depth (Inches): _____	

Remarks:

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>		
Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Water Marks (B1) (Riverine)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>		<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Surface Water Present?    Yes <input type="checkbox"/> No <input type="checkbox"/>	Depth (inches): _____	
Water Table Present?      Yes <input type="checkbox"/> No <input type="checkbox"/>	Depth (inches): _____	
Saturation Present? (includes capillary fringe)    Yes <input type="checkbox"/> No <input type="checkbox"/>	Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: depression near old culvert but no water/indicators near culvert

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP16  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco fine sandy loam NWI classification: RU3BH  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Remarks: <b>Could not dig deep enough to rule out hydric soil so it is assumed to be present due to the other 2 indicators and setting.</b>					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:
1. <u>ACSA</u>	<u>30</u>	<u>yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>6</u> (A)  Total Number of Dominant Species Across All Strata: <u>7</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>86</u> (A/B)
2. <u>ALIN</u>	<u>25</u>	<u>yes</u>	<u>FAC</u>	
3. <u>ELAN</u>	<u>29</u>	<u>yes</u>	<u>FAC</u>	
4. <u>SALA</u>	<u>10</u>	<u>no</u>	_____	
50% = <u>42.5</u> , 20% = <u>17</u>	<u>85</u>	= Total Cover		<b>Prevalence Index worksheet:</b>  Total % Cover of : _____ Multiply by: OBL species _____ x1 = _____ FACW species _____ x2 = _____ FAC species _____ x3 = _____ FACU species _____ x4 = _____ UPL species _____ x5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: _____)				
1. <u>SAEX</u>	<u>60</u>	<u>yes</u>	<u>FACW</u>	
2. <u>ELAN</u>	<u>20</u>	<u>yes</u>	<u>FAC</u>	
3. <u>RONU</u>	<u>10</u>	<u>no</u>	_____	
4. <u>PREM</u>	<u>10</u>	<u>no</u>	_____	
5. _____	_____	_____	_____	
50% = <u>50</u> , 20% = <u>20</u>	<u>100</u>	= Total Cover		
Herb Stratum (Plot size: _____)				
1. <u>APAN</u>	<u>30</u>	<u>yes</u>	<u>UPL</u>	<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>PHAR</u>	<u>25</u>	<u>yes</u>	<u>FACW</u>	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
50% = _____, 20% = _____	_____	= Total Cover		
Woody Vine Stratum (Plot size: _____)				
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
50% = _____, 20% = _____	_____	= Total Cover		
% Bare Ground in Herb Stratum _____	% Cover of Biotic Crust _____			

Remarks: appx 150' N is roses on upland area

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-3	10YR2/2	100	_____	_____	_____	_____	silt loam	_____
root	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b> Type: <u>root obstruction</u> Depth (Inches): <u>3</u>	<b>Hydric Soils Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Remarks: tried to dig several holes but it's dense roots

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input checked="" type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)
<input checked="" type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Water Marks (B1) (Riverine)
	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
	<input type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Crayfish Burrows (C8)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Shallow Aquitard (D3)
	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Surface Water Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Water Table Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe)      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: water marks on concrete debris. Swale like depression. Sediment deposit on tree bases

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 11/1/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP17  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco fine sandy loam NWI classification: RU3BH

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Remarks:					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test Worksheet:</b>	
1. <u>SOAU</u>	<u>10</u>	<u>yes</u>	<u>UPL</u>	Number of Dominant Species That Are OBL, FACW, or FAC:	<u>5</u> (A)
2. <u>ACSA</u>	<u>10</u>	<u>yes</u>	<u>FAC</u>	Total Number of Dominant Species Across All Strata:	<u>7</u> (B)
3. <u>ALIN</u>	<u>10</u>	<u>yes</u>	<u>FACW</u>	Percent of Dominant Species That Are OBL, FACW, or FAC:	<u>71</u> (A/B)
4. _____	_____	_____	_____		
50% = <u>15</u> , 20% = <u>6</u>	<u>30</u>	= Total Cover			
Sapling/Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Prevalence Index worksheet:</b>	
1. <u>RONU</u>	<u>25</u>	<u>yes</u>	<u>FACU</u>	Total % Cover of:	Multiply by:
2. <u>SAEX</u>	<u>25</u>	<u>yes</u>	<u>FACW</u>	OBL species _____	x1 = _____
3. <u>CRDO</u>	<u>10</u>	<u>no</u>	<u>FACW</u>	FACW species _____	x2 = _____
4. _____	_____	_____	_____	FAC species _____	x3 = _____
5. _____	_____	_____	_____	FACU species _____	x4 = _____
50% = <u>30</u> , 20% = <u>12</u>	<u>60</u>	= Total Cover		UPL species _____	x5 = _____
Herb Stratum (Plot size: _____)				Column Totals: _____ (A)	_____ (B)
1. <u>RUCR</u>	<u>40</u>	<u>yes</u>	<u>FAC</u>	Prevalence Index = B/A = _____	
2. <u>COMA</u>	<u>30</u>	<u>yes</u>	<u>FACW</u>	<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
3. <u>ERCA</u>	<u>20</u>	<u>no</u>	_____		
4. <u>PHAR</u>	<u>20</u>	<u>no</u>	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
50% = <u>55</u> , 20% = <u>22</u>	<u>110</u>	= Total Cover			
Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Hydrophytic Vegetation Present?</b> <div style="float: right;">                     Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> </div>	
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
50% = _____, 20% = _____	_____	= Total Cover			
% Bare Ground in Herb Stratum _____	_____	% Cover of Biotic Crust _____			
Remarks:					

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-11	10YR3/2	95	10YR5/8	5	C	M	f sandy loam	redox ox. rhiz
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input checked="" type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b>	<b>Hydric Soils Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Type: _____	
Depth (Inches): _____	

Remarks: \_\_\_\_\_

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>		
Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Water Marks (B1) (Riverine)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input checked="" type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Shallow Aquitard (D3)
<input checked="" type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>		<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Surface Water Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Water Table Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: \_\_\_\_\_

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 11/1/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP18  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco fine sandy loam NWI classification: RU3BH

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>		Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Remarks:					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test Worksheet:</b>	
1. <u>ACSA</u>	<u>25</u>	<u>yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC:	<u>5</u> (A)
2. <u>POBA</u>	<u>20</u>	<u>yes</u>	<u>FAC</u>	Total Number of Dominant Species Across All Strata:	<u>6</u> (B)
3. <u>ALIN</u>	<u>15</u>	<u>yes</u>	<u>FACW</u>	Percent of Dominant Species That Are OBL, FACW, or FAC:	<u>83</u> (A/B)
4. _____	_____	_____	_____		
50% = <u>30</u> , 20% = <u>12</u>	<u>60</u>	= Total Cover			
<b>Sapling/Shrub Stratum (Plot size: _____)</b>				<b>Prevalence Index worksheet:</b>	
1. <u>SAEX</u>	<u>30</u>	<u>yes</u>	<u>FACW</u>	Total % Cover of:	Multiply by:
2. <u>RONU</u>	<u>40</u>	<u>yes</u>	<u>FACU</u>	OBL species _____	x1 = _____
3. <u>POBA</u>	<u>25</u>	<u>yes</u>	<u>FAC</u>	FACW species _____	x2 = _____
4. _____	_____	_____	_____	FAC species _____	x3 = _____
5. _____	_____	_____	_____	FACU species _____	x4 = _____
50% = <u>50</u> , 20% = <u>20</u>	<u>100</u>	= Total Cover		UPL species _____	x5 = _____
<b>Herb Stratum (Plot size: _____)</b>				Column Totals: _____ (A)	_____ (B)
1. _____	_____	_____	_____	Prevalence Index = B/A = _____	
2. _____	_____	_____	_____	<b>Hydrophytic Vegetation Indicators:</b>	
3. _____	_____	_____	_____	<input checked="" type="checkbox"/> Dominance Test is >50%	
4. _____	_____	_____	_____	<input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup>	
5. _____	_____	_____	_____	<input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)	
6. _____	_____	_____	_____	<input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)	
7. _____	_____	_____	_____	<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
8. _____	_____	_____	_____		
50% = _____, 20% = _____	_____	= Total Cover			
<b>Woody Vine Stratum (Plot size: _____)</b>				<b>Hydrophytic Vegetation Present?</b>	
1. _____	_____	_____	_____	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
2. _____	_____	_____	_____		
50% = _____, 20% = _____	_____	= Total Cover			
% Bare Ground in Herb Stratum _____	% Cover of Biotic Crust _____				
Remarks:					

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-6	7.5YR4/2	93	7.5YR3/3	5	C	M	f sand loam	
			7.5YR4/3	2	c	M		
6-16	10YR4/3	95	10YR6/8	5	C	PL	f sand loam	root pores, ox rhiz at 6"

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)		Indicators for Problematic Hydric Soils <sup>3</sup> :	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input checked="" type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b> Type: _____ Depth (Inches): _____	<b>Hydric Soils Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Remarks:

**HYDROLOGY**

Wetland Hydrology Indicators:			
Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Water Marks (B1) (Riverine)	
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)	
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)	
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)	
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input checked="" type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Dry-Season Water Table (C2)	
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Crayfish Burrows (C8)	
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)	
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Shallow Aquitard (D3)	
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)	

<b>Field Observations:</b> Surface Water Present?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present?        Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:



## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 11/01/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP19  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco fine sandy loam NWI classification: RU3BH

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Remarks:					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test Worksheet:
1. <u>ALIN</u>	<u>10</u>	<u>yes</u>	<u>FACW</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)  Total Number of Dominant Species Across All Strata: <u>5</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>60</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
50% = <u>5</u> , 20% = <u>2</u>	<u>10</u>	= Total Cover		<b>Prevalence Index worksheet:</b> Total % Cover of: _____ Multiply by: OBL species _____ x1 = _____ FACW species _____ x2 = _____ FAC species _____ x3 = _____ FACU species _____ x4 = _____ UPL species _____ x5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: _____)				
1. <u>RONU</u>	<u>70</u>	<u>yes</u>	<u>FACU</u>	
2. <u>SAEX</u>	<u>25</u>	<u>yes</u>	<u>FACW</u>	
3. <u>ARTR</u>	<u>10</u>	<u>no</u>	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
50% = <u>52.5</u> , 20% = <u>21</u>	<u>105</u>	= Total Cover		
Herb Stratum (Plot size: _____)				
1. <u>COMA</u>	<u>40</u>	<u>yes</u>	<u>FACW</u>	<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>CIAR</u>	<u>25</u>	<u>yes</u>	<u>FACU</u>	
3. <u>PHAR</u>	<u>10</u>	<u>no</u>	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
50% = <u>37.5</u> , 20% = <u>15</u>	<u>75</u>	= Total Cover		
Woody Vine Stratum (Plot size: _____)				
1. _____	_____	_____	_____	<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
2. _____	_____	_____	_____	
50% = _____, 20% = _____	_____	= Total Cover		
% Bare Ground in Herb Stratum _____ % Cover of Biotic Crust _____				
Remarks:				

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-3	10YR2/2	100	_____	_____	_____	_____	Sandy loam	_____
3-13	10YR4/3	_____	_____	_____	_____	_____	Sandy loam	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b> Type: _____ Depth (Inches): _____	<b>Hydric Soils Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks: _____	

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Water Marks (B1) (Riverine)	<input type="checkbox"/> Water Marks (B1) (Riverine)
<input type="checkbox"/> Sediment Deposits (B2) (Riverine)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
<input type="checkbox"/> Drift Deposits (B3) (Riverine)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
<input type="checkbox"/> Drainage Patterns (B10)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Dry-Season Water Table (C2)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Crayfish Burrows (C8)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Shallow Aquitard (D3)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> FAC-Neutral Test (D5)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b> Surface Water Present?    Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____ Water Table Present?    Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe)    Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____	<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: _____	
Remarks: <u>slope from berm to wetland</u>	

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP20  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco fine sandy loam NWI classification: RU3BH

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Remarks:					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test Worksheet:</b>	
1. <u>BEPA</u>	<u>75</u>	<u>yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC:	<u>3</u> (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata:	<u>4</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC:	<u>75</u> (A/B)
4. _____	_____	_____	_____		
50% = <u>37.5</u> , 20% = <u>15</u>	<u>75</u>	= Total Cover			
<b>Sapling/Shrub Stratum (Plot size: _____)</b>				<b>Prevalence Index worksheet:</b>	
1. <u>RONU</u>	<u>40</u>	<u>yes</u>	<u>FACU</u>	Total % Cover of:	Multiply by:
2. <u>CRDO</u>	<u>15</u>	<u>yes</u>	<u>FACW</u>	OBL species _____	x1 = _____
3. <u>ALIN</u>	<u>5</u>	<u>no</u>	_____	FACW species _____	x2 = _____
4. _____	_____	_____	_____	FAC species _____	x3 = _____
5. _____	_____	_____	_____	FACU species _____	x4 = _____
50% = <u>30</u> , 20% = <u>12</u>	<u>60</u>	= Total Cover		UPL species _____	x5 = _____
<b>Herb Stratum (Plot size: _____)</b>				Column Totals: _____ (A)	_____ (B)
1. _____	_____	_____	_____	Prevalence Index = B/A = _____	
2. _____	_____	_____	_____	<b>Hydrophytic Vegetation Indicators:</b>	
3. _____	_____	_____	_____	<input checked="" type="checkbox"/> Dominance Test is >50%	
4. _____	_____	_____	_____	<input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup>	
5. _____	_____	_____	_____	<input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)	
6. _____	_____	_____	_____	<input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)	
7. _____	_____	_____	_____	<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
8. _____	_____	_____	_____		
50% = _____, 20% = _____	_____	= Total Cover			
<b>Woody Vine Stratum (Plot size: _____)</b>				<b>Hydrophytic Vegetation Present?</b>	
1. <u>CLLI</u>	<u>15</u>	<u>yes</u>	<u>FAC</u>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
2. _____	_____	_____	_____		
50% = <u>7.5</u> , 20% = <u>3</u>	<u>15</u>	= Total Cover			
% Bare Ground in Herb Stratum _____	% Cover of Biotic Crust _____				
Remarks:					

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-12	2.5Y4/3	98	2.5Y3/3	2	_____	_____	sandy loam	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b>	<b>Hydric Soils Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Type: <u>root</u>	
Depth (Inches): <u>12</u>	

Remarks:

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Water Marks (B1) (Riverine)
	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
	<input type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Crayfish Burrows (C8)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Shallow Aquitard (D3)
	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Surface Water Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Water Table Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe)      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 10/31/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP21  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco fine sandy loam NWI classification: RU3BH

Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Remarks:					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test Worksheet:</b>	
1. _____	_____	_____	_____	Number of Dominant Species That Are OBL, FACW, or FAC:	1 (A)
2. _____	_____	_____	_____	Total Number of Dominant Species Across All Strata:	1 (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC:	100 (A/B)
4. _____	_____	_____	_____		
50% = _____, 20% = _____	_____	= Total Cover			
<b>Sapling/Shrub Stratum (Plot size: _____)</b>				<b>Prevalence Index worksheet:</b>	
1. _____	_____	_____	_____	Total % Cover of:	Multiply by:
2. _____	_____	_____	_____	OBL species _____	x1 = _____
3. _____	_____	_____	_____	FACW species _____	x2 = _____
4. _____	_____	_____	_____	FAC species _____	x3 = _____
5. _____	_____	_____	_____	FACU species _____	x4 = _____
50% = _____, 20% = _____	_____	= Total Cover		UPL species _____	x5 = _____
<b>Herb Stratum (Plot size: _____)</b>				Column Totals: _____ (A)	_____ (B)
1. <u>PHAR</u>	95	yes	_____	Prevalence Index = B/A = _____	
2. <u>CIAR</u>	5	no	_____	<b>Hydrophytic Vegetation Indicators:</b>	
3. _____	_____	_____	_____	<input checked="" type="checkbox"/> Dominance Test is >50%	
4. _____	_____	_____	_____	<input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup>	
5. _____	_____	_____	_____	<input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)	
6. _____	_____	_____	_____	<input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)	
7. _____	_____	_____	_____	<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
8. _____	_____	_____	_____		
50% = <u>50</u> , 20% = <u>20</u>	100	= Total Cover			
<b>Woody Vine Stratum (Plot size: _____)</b>				<b>Hydrophytic Vegetation Present?</b>	
1. _____	_____	_____	_____	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
2. _____	_____	_____	_____		
50% = _____, 20% = _____	_____	= Total Cover			
% Bare Ground in Herb Stratum _____	% Cover of Biotic Crust _____				
Remarks:					

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-6	10YR4/3	100	_____	_____	_____	_____	f sand loam	_____
6-14	10YR4/2	100	_____	_____	_____	_____	_____	no redox
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b> Type: _____ Depth (Inches): _____	<b>Hydric Soils Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
--	--

Remarks:

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>	
Primary Indicators (minimum of one required; check all that apply)	Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)
	<input type="checkbox"/> Water Marks (B1) (Riverine)
	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
	<input checked="" type="checkbox"/> Drainage Patterns (B10)
	<input type="checkbox"/> Dry-Season Water Table (C2)
	<input type="checkbox"/> Crayfish Burrows (C8)
	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
	<input type="checkbox"/> Shallow Aquitard (D3)
	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Surface Water Present?      Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____	
Water Table Present?      Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe)      Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: located appx 2' above surface water and 10' from water near a flood channel

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 11/1/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP22  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): 0-10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Riverwash NWI classification: RU3BH  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Remarks:					

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test Worksheet:</b>	
1. <u>ACSA</u>	<u>60</u>	<u>yes</u>	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC:	<u>4</u> (A)
2. <u>ALIN</u>	<u>40</u>	<u>yes</u>	<u>FACW</u>	Total Number of Dominant Species Across All Strata:	<u>4</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC:	<u>100</u> (A/B)
4. _____	_____	_____	_____		
50% = <u>50</u> , 20% = <u>20</u>	<u>100</u>	= Total Cover			
Sapling/Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Prevalence Index worksheet:</b>	
1. <u>ALIN</u>	<u>10</u>	<u>yes</u>	<u>FACW</u>	Total % Cover of:	Multiply by:
2. <u>ACSA</u>	<u>10</u>	<u>yes</u>	<u>FAC</u>	OBL species _____	x1 = _____
3. _____	_____	_____	_____	FACW species _____	x2 = _____
4. _____	_____	_____	_____	FAC species _____	x3 = _____
5. _____	_____	_____	_____	FACU species _____	x4 = _____
50% = <u>10</u> , 20% = <u>2</u>	<u>20</u>	= Total Cover		UPL species _____	x5 = _____
Herb Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Column Totals: _____ (A)	_____ (B)
1. _____	_____	_____	_____	Prevalence Index = B/A = _____	
2. _____	_____	_____	_____	<b>Hydrophytic Vegetation Indicators:</b>	
3. _____	_____	_____	_____	<input checked="" type="checkbox"/> Dominance Test is >50%	
4. _____	_____	_____	_____	<input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup>	
5. _____	_____	_____	_____	<input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)	
6. _____	_____	_____	_____	<input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)	
7. _____	_____	_____	_____	<sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.	
8. _____	_____	_____	_____		
50% = _____, 20% = _____	_____	= Total Cover			
Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Hydrophytic Vegetation Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
1. _____	_____	_____	_____		
2. _____	_____	_____	_____		
50% = _____, 20% = _____	_____	= Total Cover			
% Bare Ground in Herb Stratum _____	% Cover of Biotic Crust _____				
Remarks:					

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-10	2.53/1	80	7.5YR6/8	20	C	M	silt loam	mucky condit
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input checked="" type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b>	<b>Hydric Soils Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Type: <u>root</u>	
Depth (Inches): <u>12</u>	

Remarks:

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>		
Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input checked="" type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Water Marks (B1) (Riverine)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>		<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Surface Water Present?      Yes <input type="checkbox"/> No <input type="checkbox"/>	Depth (inches): <u>2</u>	
Water Table Present?      Yes <input type="checkbox"/> No <input type="checkbox"/>	Depth (inches): <u>1</u>	
Saturation Present? (includes capillary fringe)      Yes <input type="checkbox"/> No <input type="checkbox"/>	Depth (inches): <u>surface</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:



## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 11/1/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP23  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): -10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco fine sandy loam NWI classification: RU3BH  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>				
Remarks: <u>appx 3' from toe of slope and appx 9' from road edge</u>						

### VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status																		
1. <u>ACSA</u>	<u>40</u>	<u>yes</u>	<u>FAC</u>	<b>Dominance Test Worksheet:</b>  Number of Dominant Species That Are OBL, FACW, or FAC: <u>6</u> (A)  Total Number of Dominant Species Across All Strata: <u>6</u> (B)  Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100</u> (A/B)																	
2. <u>ALIN</u>	<u>20</u>	<u>yes</u>	<u>FACW</u>																		
3. _____	_____	_____	_____																		
4. _____	_____	_____	_____																		
50% = <u>30</u> , 20% = <u>12</u>	<u>60</u>	= Total Cover																			
<b>Sapling/Shrub Stratum (Plot size: _____)</b>																					
1. <u>ACSA</u>	<u>20</u>	<u>yes</u>	<u>FAC</u>	<b>Prevalence Index worksheet:</b>  <table style="width: 100%; border: none;"> <tr> <td style="text-align: right;">Total % Cover of:</td> <td style="text-align: left;">Multiply by:</td> </tr> <tr> <td>OBL species _____</td> <td>x1 = _____</td> </tr> <tr> <td>FACW species _____</td> <td>x2 = _____</td> </tr> <tr> <td>FAC species _____</td> <td>x3 = _____</td> </tr> <tr> <td>FACU species _____</td> <td>x4 = _____</td> </tr> <tr> <td>UPL species _____</td> <td>x5 = _____</td> </tr> <tr> <td>Column Totals: _____ (A)</td> <td>_____ (B)</td> </tr> <tr> <td colspan="2" style="text-align: center;">Prevalence Index = B/A = _____</td> </tr> </table>	Total % Cover of:	Multiply by:	OBL species _____	x1 = _____	FACW species _____	x2 = _____	FAC species _____	x3 = _____	FACU species _____	x4 = _____	UPL species _____	x5 = _____	Column Totals: _____ (A)	_____ (B)	Prevalence Index = B/A = _____		
Total % Cover of:	Multiply by:																				
OBL species _____	x1 = _____																				
FACW species _____	x2 = _____																				
FAC species _____	x3 = _____																				
FACU species _____	x4 = _____																				
UPL species _____	x5 = _____																				
Column Totals: _____ (A)	_____ (B)																				
Prevalence Index = B/A = _____																					
2. <u>ALIN</u>	<u>20</u>	<u>yes</u>	<u>FACW</u>																		
3. _____	_____	_____	_____																		
4. _____	_____	_____	_____																		
5. _____	_____	_____	_____																		
50% = <u>20</u> , 20% = <u>8</u>	<u>40</u>	= Total Cover																			
<b>Herb Stratum (Plot size: _____)</b>																					
1. <u>ACSA</u>	<u>20</u>	<u>yes</u>	<u>FAC</u>	<b>Hydrophytic Vegetation Indicators:</b> <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup> <input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)  <sup>1</sup> Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.																	
2. <u>GLGR</u>	<u>35</u>	<u>yes</u>	<u>OBL</u>																		
3. <u>PHAR</u>	<u>10</u>	<u>no</u>	<u>FACW</u>																		
4. <u>POHY</u>	<u>10</u>	<u>no</u>	<u>OBL</u>																		
5. _____	_____	_____	_____																		
6. _____	_____	_____	_____																		
7. _____	_____	_____	_____																		
8. _____	_____	_____	_____																		
50% = <u>37.5</u> , 20% = <u>15</u>	<u>75</u>	= Total Cover																			
<b>Woody Vine Stratum (Plot size: _____)</b>																					
1. _____	_____	_____	_____	<b>Hydrophytic Vegetation Present?</b>	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>																
2. _____	_____	_____	_____																		
50% = _____, 20% = _____	_____	= Total Cover																			
% Bare Ground in Herb Stratum _____	_____	% Cover of Biotic Crust _____																			
Remarks:																					

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-10	2.5Y2.5/1						silt loam	
10-18	2.5Y2.5/1	60	10YR3/1	35	C	M	silt loam	
			7.5YR4/6	5	C	M		

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input checked="" type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b> Type: _____ Depth (Inches): _____	<b>Hydric Soils Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
--	--

Remarks:

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>		
Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Water Marks (B1) (Riverine)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Shallow Aquitard (D3)
<input checked="" type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	
Surface Water Present?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	<b>Wetland Hydrology Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Water Table Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe)    Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>10</u>	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## WETLAND DETERMINATION DATA FORM – Arid West Region

Project Site: Yakima River Gateway City/County: West Richland/Benton Sampling Date: 11/1/14  
 Applicant/Owner: City of West Richland State: WA Sampling Point: DP24  
 Investigator(s): M. Anderson Section, Township, Range: 5/09N/28E  
 Landform (hillslope, terrace, etc.): floodplain Local relief (concave, convex, none): none Slope (%): 0-10  
 Subregion (LRR): B Lat: 46.296 Long: -119.3321 Datum: NAVD88  
 Soil Map Unit Name: Pasco fine sandy loam NWI classification: RU3BH  
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes  No  (If no, explain in Remarks.)  
 Are Vegetation , Soil , or Hydrology  significantly disturbed? Are "Normal Circumstances" present? Yes  No   
 Are Vegetation , Soil , or Hydrology  naturally problematic? (If needed, explain any answers in Remarks.)

**SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.**

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	<b>Is the Sampled Area within a Wetland?</b>	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Remarks: <u>on berm south of sagebrush in hawthorne patch</u>					

**VEGETATION – Use scientific names of plants.**

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	<b>Dominance Test Worksheet:</b>	
1. <u>ULPU</u>	<u>10</u>	<u>yes</u>	<u>UPL</u>	Number of Dominant Species That Are OBL, FACW, or FAC:	<u>4</u> (A)
2. <u>SALA</u>	<u>10</u>	<u>yes</u>	<u>FACW</u>	Total Number of Dominant Species Across All Strata:	<u>6</u> (B)
3. _____	_____	_____	_____	Percent of Dominant Species That Are OBL, FACW, or FAC:	<u>66</u> (A/B)
4. _____	_____	_____	_____		
50% = <u>10</u> , 20% = <u>2</u>	<u>20</u>	= Total Cover			
<b>Sapling/Shrub Stratum (Plot size: _____)</b>				<b>Prevalence Index worksheet:</b>	
1. <u>CRDO</u>	<u>70</u>	<u>yes</u>	<u>FACW</u>	Total % Cover of:	Multiply by:
2. <u>RONU</u>	<u>25</u>	<u>yes</u>	<u>FACU</u>	OBL species _____	x1 = _____
3. _____	_____	_____	_____	FACW species _____	x2 = _____
4. _____	_____	_____	_____	FAC species _____	x3 = _____
5. _____	_____	_____	_____	FACU species _____	x4 = _____
50% = <u>47.5</u> , 20% = <u>19</u>	<u>95</u>	= Total Cover		UPL species _____	x5 = _____
<b>Herb Stratum (Plot size: _____)</b>				Column Totals: _____ (A)	_____ (B)
1. <u>COMA</u>	<u>10</u>	<u>yes</u>	<u>FACW</u>	Prevalence Index = B/A = _____	
2. _____	_____	_____	_____		
3. _____	_____	_____	_____		
4. _____	_____	_____	_____		
5. _____	_____	_____	_____		
6. _____	_____	_____	_____		
7. _____	_____	_____	_____		
8. _____	_____	_____	_____		
50% = <u>5</u> , 20% = <u>2</u>	<u>10</u>	= Total Cover			
<b>Woody Vine Stratum (Plot size: _____)</b>				<b>Hydrophytic Vegetation Indicators:</b>	
1. <u>CLLI</u>	<u>30</u>	<u>yes</u>	<u>FAC</u>	<input checked="" type="checkbox"/> Dominance Test is >50%	
2. _____	_____	_____	_____	<input type="checkbox"/> Prevalence Index is ≤3.0 <sup>1</sup>	
50% = <u>15</u> , 20% = <u>6</u>	<u>30</u>	= Total Cover		<input type="checkbox"/> Morphological Adaptations <sup>1</sup> (Provide supporting data in Remarks or on a separate sheet)	
% Bare Ground in Herb Stratum _____	% Cover of Biotic Crust _____			<input type="checkbox"/> Problematic Hydrophytic Vegetation <sup>1</sup> (Explain)	
Remarks:				<b>Hydrophytic Vegetation Present?</b>	
				Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

**SOIL**

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (Moist)	%	Type <sup>1</sup>	Loc <sup>2</sup>		
0-6	2.5Y3/2	98	2.5Y6/8	2	C	M	sandy loam	_____
6-14	2.5Y4/3	98	2.5Y6/8	2	C	M	f sand loam	very dry
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____	_____

<sup>1</sup>Type: C= Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. <sup>2</sup>Location: PL=Pore Lining, M=Matrix.

<b>Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)</b>		<b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>	
<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 1 cm Muck (A9) (LRR C)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> 2 cm Muck (A10) (LRR B)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1)	<input type="checkbox"/> Reduced Vertic (F18)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Red Parent Material (TF2)	
<input type="checkbox"/> Stratified Layers (A5) (LRR C)	<input type="checkbox"/> Depleted Matrix (F3)	<input type="checkbox"/> Other (Explain in Remarks)	
<input type="checkbox"/> 1 cm Muck (A9) (LRR D)	<input checked="" type="checkbox"/> Redox Dark Surface (F6)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Dark Surface (F7)		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Depressions (F8)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Vernal Pools (F9)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)			

<sup>3</sup>Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

<b>Restrictive Layer (if present):</b> Type: _____ Depth (Inches): _____	<b>Hydric Soils Present?</b> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
--	--

Remarks: percentage of redox is borderline.

**HYDROLOGY**

<b>Wetland Hydrology Indicators:</b>		
Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Water Marks (B1) (Riverine)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Biotic Crust (B12)	<input type="checkbox"/> Sediment Deposits (B2) (Riverine)
<input type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Drift Deposits (B3) (Riverine)
<input type="checkbox"/> Water Marks (B1) (Nonriverine)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Drainage Patterns (B10)
<input type="checkbox"/> Sediment Deposits (B2) (Nonriverine)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input type="checkbox"/> Drift Deposits (B3) (Nonriverine)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Crayfish Burrows (C8)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Thin Muck Surface (C7)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Water-Stained Leaves (B9)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> FAC-Neutral Test (D5)

<b>Field Observations:</b>	
Surface Water Present?    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	<b>Wetland Hydrology Present?</b> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Water Table Present?      Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	
Saturation Present? (includes capillary fringe)    Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: no inundation/water in an active floodplain but elevation is high. Water stained leaves present but faint

## APPENDIX B. EASTERN WASHINGTON WETLAND RATING FORMS

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Wetland name or number: \_\_\_\_\_

**WETLAND RATING FORM – EASTERN WASHINGTON**

Version 2 – Updated July 2006 to increase accuracy and reproducibility among users –  
Updated Oct. 2008 with the new WDFW definitions for priority habitats

Name of wetland (if known): A

Date of site visit: 11/7/14

Rated by: M. Anderson

Trained by Ecology?  Yes  No

Date of training: 09/2011

SEC: 32

TWNSHP: 10N

RNGE: 28E

Is S/T/R in Appendix D?  Yes  No

Map of wetland unit: **Figure 1**

Estimated size 49

**SUMMARY OF RATING**

Category based on FUNCTIONS provided by wetland:  I  II  III  IV

Category I =	Score > 70
Category II =	Score 51 - 69
Category III =	Score 30 - 50
Category IV =	Score < 30

Score for “Water Quality” Functions

**22**

Score for Hydrologic Functions

**28**

Score for Habitat Functions

**26**

TOTAL score for Functions

**77**

Category based on SPECIAL CHARACTERISTICS of Wetland:  I  II  III  Does not Apply

**Final Category** (choose the “highest” category from above)

**I**

**Summary of basic information about the wetland unit.**

Wetland Type		Wetland Class	
Vernal Pool	<input type="checkbox"/>	Depressional	<input type="checkbox"/>
Alkali	<input type="checkbox"/>	Riverine	<input checked="" type="checkbox"/>
Natural Heritage Wetland	<input type="checkbox"/>	Lake-fringe	<input type="checkbox"/>
Bog	<input type="checkbox"/>	Slope	<input type="checkbox"/>
Forest	<input checked="" type="checkbox"/>	Check if unit has multiple HGM classes present	<input type="checkbox"/>
None of the above	<input type="checkbox"/>		

**Does the wetland being rated meet any of the criteria below?**

If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands that Need Special and that are Not Included in the Rating	YES	NO
SP1. <i>Has the wetland unit been documented as a habitat for any Federally listed Threatened or Endangered <b>animal or plant</b> species (T/E species)?</i> For the purposes of this rating system, “documented” means the wetland is on the appropriate state or federal database.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
SP2. <i>Has the wetland unit been documented as habitat for any State listed Threatened or Endangered <b>animal</b> species?</i> For the purposes of this rating system, “documented” means the wetland is on the appropriate state database. Note: Wetlands with State listed plant species are categorized as Category 1 Natural Heritage Wetlands (see p. 19 of data form).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
SP3. <i>Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
SP4. <i>Does the wetland unit have a local significance in addition to its functions?</i> For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.**

The hydrogeomorphic classification groups wetlands into those that function in similar ways. Classifying the wetland first simplifies the questions needed to answer how it functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 20 for more detailed instructions on classifying wetlands.

Wetland name or number: \_\_\_\_\_

### Classification of Vegetated Wetlands for Eastern Washington

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Does the entire wetland unit **meet both** of the following criteria?
- The vegetated part of the wetland is on the shores of a body of open water (without any vegetation on the surface) where at least 20 acres (8 ha) in size;
  - At least 30% of the open water area is deeper than 3 m (10 ft)?
- NO – go to Step 2       YES – The wetland class is **Lake-fringe (lacustrine fringe)**
- 
2. Does the wetland unit **meet all** of the following criteria?
- The wetland is on a slope (*slope can be very gradual*).
  - The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.
  - The water leaves the wetland **without being impounded**?
- NOTE: *Surface water does not pond in these types of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than a foot deep).*
- NO – go to Step 3       YES – The wetland class is **Slope**
- 
3. Is the wetland unit in a valley or stream channel where it gets inundated by overbank flooding from that stream or river? In general, the flooding should occur at least once every ten years to answer “yes”. *The wetland can contain depressions that are filled with water when the river is not flooding.*
- NO – go to Step 4       YES – The wetland class is **Riverine**
- 
4. Is the wetland unit in a topographic depression, outside areas that are inundated by overbank flooding, in which water ponds, or is saturated to the surface, at some time of the year. *This means that any outlet, if present is higher than the interior of the wetland.*
- NO – go to Step 5       YES – The wetland class is **Depressional**
- 
5. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. **GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT** (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the class listed in column 2 is less than 10% of the unit, classify the wetland using the class that represents more than 90% of the total area.

<i>HGM Classes Within One Delineated Wetland Boundary</i>	<i>Class to Use for Rating</i>
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine (riverine is within boundary of depression)	Depressional
Depressional + Lake-fringe	Depressional

If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.



Wetland name or number: \_\_\_\_\_

<b>D Depressional and Flat Wetlands</b>		<b>Points</b> (only 1 score per box)
<b>WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.</b>		
<b>D 1</b>	<b>Does the wetland unit have the potential to improve water quality?</b>	(see p.38)
D 1.1	Characteristics of surface water flows out of the wetland unit: <ul style="list-style-type: none"> <li>• Wetland has no surface water outlet..... points = 5 <input type="checkbox"/></li> <li>• Wetland has an intermittently flowing outlet..... points = 3 <input type="checkbox"/></li> <li>• Wetland has a highly constricted permanently flowing outlet..... points = 3 <input type="checkbox"/></li> <li>• Wetland has a permanently flowing surface outlet ..... points = 1 <input type="checkbox"/></li> </ul>	
D 1.2	The soil 2 inches below the surface (or duff layer) is clay or organic (use NRCS definition of soil types). <input type="checkbox"/> <b>YES</b> points = 3 <input checked="" type="checkbox"/> <b>NO</b> points = 0	
D 1.3	Characteristics of persistent vegetation (emergent, shrub, and/or forest Cowardin class): <ul style="list-style-type: none"> <li>• Wetland has persistent, ungrazed vegetation for &gt; = 2/3 of area..... points = 5 <input type="checkbox"/></li> <li>• Wetland has persistent, ungrazed vegetation from 1/3 to 2/3 of area ..... points = 3 <input type="checkbox"/></li> <li>• Wetland has persistent, ungrazed vegetation from 1/10 to &lt; 1/3 of area ..... points = 1 <input type="checkbox"/></li> <li>• Wetland has persistent, ungrazed vegetation &lt; 1/10 of area..... points = 0 <input type="checkbox"/></li> </ul> <p style="text-align: right;"><b>Map of Cowardin vegetation classes</b></p>	<b>Figure</b> <input type="checkbox"/>
D 1.4	Characteristics of seasonal ponding or inundation: <i>This is the area of ponding that fluctuates every year. Do not count the area that is permanently ponded.</i> <ul style="list-style-type: none"> <li>• Area seasonally ponded is &gt; 1/2 total area of wetland ..... points = 3 <input type="checkbox"/></li> <li>• Area seasonally ponded is 1/4 to 1/2 total area of wetland ..... points = 1 <input type="checkbox"/></li> <li>• Area seasonally ponded is &lt; 1/4 total area of wetland ..... points = 0 <input type="checkbox"/></li> </ul> <p>NOTE: See text for indicators of seasonal and permanent inundation/flooding ..... <b>Map of Hydroperiods</b></p>	<b>Figure</b> <input type="checkbox"/>
<b>Total for D 1</b>		<i>Add the points in the boxes above</i>
<b>D 2</b>	<b>Does the wetland unit have the opportunity to improve water quality?</b> Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? <i>Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.</i> <input type="checkbox"/> Grazing in the wetland or within 150 ft <input checked="" type="checkbox"/> Untreated stormwater discharges to wetland <input type="checkbox"/> Tilled fields or orchards within 150 ft. of wetland <input type="checkbox"/> A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging <input checked="" type="checkbox"/> Residential, urban areas, golf courses are within 150 ft. of wetland <input type="checkbox"/> Wetland is fed by groundwater high in phosphorus or nitrogen <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> <b>YES</b> multiplier is 2 <input type="checkbox"/> <b>NO</b> multiplier is 1	Multiplier
<b>◆ TOTAL – Water Quality Functions</b> Multiply the score from D1 by D2. <b>Record score on p. 1 of field form</b>		_____
<b>HYDROLOGIC FUNCTIONS – Indicators that wetland functions to reduce flooding and stream erosion.</b>		
<b>D 3</b>	<b>Does the wetland unit have the potential to reduce flooding and stream erosion?</b>	(see p.39)
D 3.1	Characteristics of surface water flows out of the wetland unit: <ul style="list-style-type: none"> <li>• Wetland has no surface water outlet..... points = 8 <input type="checkbox"/></li> <li>• Wetland has an intermittently flowing outlet..... points = 4 <input type="checkbox"/></li> <li>• Wetland has a highly constricted permanently flowing outlet..... points = 4 <input type="checkbox"/></li> <li>• Wetland has a permanently flowing surface outlet ..... points = 0 <input type="checkbox"/></li> </ul>	
D 3.2	Depth of storage during wet periods. <i>Estimate the height of ponding above the surface of the wetland (see text for description of measuring height). In wetlands with permanent ponding, the surface is the lowest elevation of “permanent” water.</i> <ul style="list-style-type: none"> <li>• Marks of ponding are at least 3 ft. above the surface..... points = 8 <input type="checkbox"/></li> <li>• The wetland is a “headwater” wetland (see p. 39) ..... points = 6 <input type="checkbox"/></li> <li>• Marks are 2 ft. to &lt; 3 ft. from surface ..... points = 6 <input type="checkbox"/></li> <li>• Marks are 1 ft. to &lt; 2 ft. from surface ..... points = 4 <input type="checkbox"/></li> <li>• Marks are 6 in. to &lt; 1 ft. from surface..... points = 2 <input type="checkbox"/></li> <li>• No marks above 6 in. or wetland has only saturated soils..... points = 0 <input type="checkbox"/></li> </ul>	
<b>Total for D 3</b>		<i>Add the points in the boxes above</i>
<b>D 4</b>	<b>Does the wetland unit have the opportunity to reduce flooding and erosion?</b> Answer NO if the major source of water is groundwater, irrigation return flow, or water levels in the wetland are controlled by a reservoir. Answer YES if the wetland is in a location in the watershed where the flood storage, or reduction in water velocity it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. <i>Note which of the following conditions apply.</i> <input type="checkbox"/> Wetland is in a headwater of a river or stream that has flooding problems. <input type="checkbox"/> Wetland drains to a river or stream that has flooding problems <input type="checkbox"/> Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems <input type="checkbox"/> Other _____ <input type="checkbox"/> <b>YES</b> multiplier is 2 <input type="checkbox"/> <b>NO</b> multiplier is 1	Multiplier
<b>◆ TOTAL – Hydrologic Functions</b> Multiply the score from D3 by D4; then <b>record score on p.1 of field form.</b>		_____

Wetland name or number: \_\_\_\_\_

<b>R Riverine Wetlands</b>		<b>Points</b> (only 1 score per box)
WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.		
<b>R 1</b>	<b>Does the wetland unit have the potential to improve water quality?</b>	(see p.45)
R 1.1	Area of surface depressions within the riverine wetland that can trap sediments during a flooding event: <ul style="list-style-type: none"> <li>• Depressions cover &gt; 1/3 area of wetland ..... points = 6 <input checked="" type="checkbox"/></li> <li>• Depressions cover &gt; 1/10 area of wetland ..... points = 3 <input type="checkbox"/></li> </ul> <p style="text-align: center;"><b>If depressions &gt; 1/10<sup>th</sup> of area of unit draw polygons on aerial photo or map.</b></p> <ul style="list-style-type: none"> <li>• Depressions present but cover &lt; 1/10 area of wetland ..... points = 1 <input type="checkbox"/></li> <li>• No depressions present ..... points = 0 <input type="checkbox"/></li> </ul>	Figure <input checked="" type="checkbox"/>  6
R 1.2	Characteristics (cover) of the vegetation in the unit ( <i>area of polygons with &gt; 90% cover at person height. This is not Cowardin vegetation classes</i> ): <ul style="list-style-type: none"> <li>• Forest or shrub &gt; 2/3 the area of the wetland..... points =10 <input type="checkbox"/></li> <li>• Forest or shrub 1/3 – 2/3 area of the wetland..... points = 5 <input checked="" type="checkbox"/></li> <li>• Ungrazed, herbaceous plants &gt; 2/3 area of wetland ..... points = 5 <input type="checkbox"/></li> <li>• Ungrazed herbaceous plants 1/3 – 2/3 area of wetland ..... points = 2 <input type="checkbox"/></li> <li>• Forest, shrub, and ungrazed herbaceous &lt; 1/3 area of wetland ..... points = 0 <input type="checkbox"/></li> </ul> <p style="text-align: center;"><b>Aerial photo or map showing polygons of different vegetation cover</b></p>	Figure <input checked="" type="checkbox"/>  5
Total for R1		Add the points in the boxes above
		<b>11</b>
<b>R 2</b>	<b>Does the wetland have the opportunity to improve water quality?</b>	(see p. 46)
<p>Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. <i>Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.</i></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Grazing in the wetland or within 150 ft</li> <li><input type="checkbox"/> Wetland intercepts groundwater within the Reclamation Area</li> <li><input checked="" type="checkbox"/> Untreated stormwater flows into wetland</li> <li><input type="checkbox"/> Tilled fields or orchards within 150 ft. of wetland</li> <li><input type="checkbox"/> Water flows into wetland from a stream or culvert that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging</li> <li><input checked="" type="checkbox"/> Residential or urban areas are within 150 ft. of wetland</li> <li><input checked="" type="checkbox"/> The river or stream that floods the wetland has a contributing basin where human activities have raised levels of sediment, toxic compounds or nutrients in the river water above water quality standards.</li> <li><input type="checkbox"/> Other _____</li> </ul> <p style="text-align: center;"><input checked="" type="checkbox"/> <b>YES</b> multiplier is 2      <input type="checkbox"/> <b>NO</b> multiplier is 1</p>		Multiplier  2
<b>◆ TOTAL – Water Quality Functions</b>		<b>22</b>
Multiply the score from R1 by the multiplier in R2; then <i>record score on p.1 of field form.</i>		
HYDROLOGIC FUNCTIONS – Indicators that wetland functions to reduce flooding and stream degradation.		
<b>R 3</b>	<b>Does the wetland have the potential to reduce flooding and erosion?</b>	(see p.47)
R 3.1	Amount overbank storage the wetland provides: <i>Estimate the average width of the wetland perpendicular to the direction of the flow of water and the width of the stream or river channel (distance between banks). Calculate the ratio: width of wetland / width of stream.</i> <ul style="list-style-type: none"> <li>• If the ratio is 2 or more ..... points =10 <input type="checkbox"/></li> <li>• If the ratio is between 1 and &lt; 2 ..... points = 8 <input checked="" type="checkbox"/></li> <li>• If the ratio is 1/2 to &lt; 1 ..... points = 4 <input type="checkbox"/></li> <li>• If the ratio is 1/4 to &lt; 1/2 ..... points = 2 <input type="checkbox"/></li> <li>• If the ratio is &lt; 1/4 ..... points = 1 <input type="checkbox"/></li> </ul> <p style="text-align: center;"><b>Aerial photo or map showing average widths</b></p>	Figure <input checked="" type="checkbox"/>  8
R 3.2	Characteristics of vegetation that slow down water velocities during floods: <i>Treat large woody debris as "forest or shrub" (areas of polygons with &gt; 90% cover at person height. This is not Cowardin vegetation classes)</i> : <ul style="list-style-type: none"> <li>• Forest or shrub for more than 2/3 the area of the wetland..... points = 6 <input checked="" type="checkbox"/></li> <li>• Forest or shrub for &gt; 1/3 area OR herbaceous plants &gt; 2/3 area..... points = 4 <input type="checkbox"/></li> <li>• Forest or shrub for &gt; 1/10 area OR herbaceous plants &gt; 1/3 area..... points = 2 <input type="checkbox"/></li> <li>• Vegetation does not meet above criteria ..... points = 0 <input type="checkbox"/></li> </ul> <p style="text-align: center;"><b>Aerial photo or map showing polygons of different vegetation types</b></p>	Figure <input checked="" type="checkbox"/>  6
Total for R3		Add the points in the boxes above
		<b>14</b>
<b>R 4</b>	<b>Does the wetland have the opportunity to reduce flooding and erosion?</b>	(see p.50)
<p>Answer NO if the major source of water is irrigation return flow or water levels are controlled by a reservoir. Answer YES if the wetland is in a location in the watershed where the flood storage, or reduction in water velocity it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. <i>Note which of the following conditions apply.</i></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> There are human structures and activities downstream (roads, buildings, bridges, farms) that can be damaged by flooding.</li> <li><input checked="" type="checkbox"/> There are natural resources downstream (e.g. salmon redds) that can be damaged by flooding</li> <li><input type="checkbox"/> Other _____</li> </ul> <p style="text-align: center;"><input checked="" type="checkbox"/> <b>YES</b> multiplier is 2      <input type="checkbox"/> <b>NO</b> multiplier is 1</p>		Multiplier  2
<b>◆ TOTAL – Hydrologic Functions</b>		<b>28</b>
Multiply the score from R3 by the multiplier in R4. <i>Record score on p.1 of field form.</i>		

Wetland name or number: \_\_\_\_\_

<b>L Lake-fringe Wetlands</b>		<b>Points</b>
WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.		(only 1 score per box)
<b>L 1</b>	<b>Does the wetland have the potential to improve water quality?</b>	(see p.52)
	L 1.1 Average width of vegetation along the lakeshore: • Vegetation is more than 33 ft. (10m) wide ..... points = 6 <input type="checkbox"/> • Vegetation is more than 16 ft.(5m) wide and < 33 ft wide ..... points = 3 <input type="checkbox"/> • Vegetation is 6 ft. (2m) wide to < 16 ft wide ..... points = 1 <input type="checkbox"/> <b>Map of Cowardin classes with widths marked</b>	Figure <input type="checkbox"/>
	L 1.2 Characteristics of the vegetation in the wetland: <i>Choose the appropriate description that results in the highest points, and do not include any open water in your estimate of coverage. The herbaceous plants can be either the dominant form or as an understory in a shrub or forest community. These are not Cowardin classes. Area of Cover is total cover in the unit, but it can be in patches. NOTE: Herbaceous does not include aquatic bed.</i> • Herbaceous plants cover > 90% of the vegetated area ..... points = 6 <input type="checkbox"/> • Herbaceous plants cover > 2/3 of the vegetated area ..... points = 4 <input type="checkbox"/> • Herbaceous plants cover > 1/3 of the vegetated area ..... points = 3 <input type="checkbox"/> • Other vegetation that is not aquatic bed in > 2/3 vegetated area ..... points = 3 <input type="checkbox"/> • Other vegetation that is not aquatic bed in > 1/3 vegetated area ..... points = 1 <input type="checkbox"/> • Aquatic bed cover > 2/3 of the vegetated area ..... points = 0 <input type="checkbox"/> <b>Map with polygons of different vegetation types</b>	Figure <input type="checkbox"/>
Total for L1		Add the points in the boxes above
<b>L 2</b>	<b>Does the wetland have the opportunity to improve water quality?</b>	(see p.53)
	Answer YES if you know or believe there are pollutants in the lake water, or surface water flowing through the wetland to the lake is polluted. <i>Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.</i> <input type="checkbox"/> Wetland is along the shores of a lake or reservoir that does not meet water quality standards <input type="checkbox"/> Grazing in the wetland or within 150 ft <input type="checkbox"/> Untreated stormwater flows into the wetland <input type="checkbox"/> Tilled fields or orchards within 150 ft. of wetland <input type="checkbox"/> Residential or urban areas are within 150 ft. of wetland <input type="checkbox"/> Powerboats with gasoline or diesel engines use the lake <input type="checkbox"/> Parks with grassy areas that are maintained, ballfields, golf courses (all within 150 ft. of shore of lake) <input type="checkbox"/> Other _____ <input type="checkbox"/> <b>YES</b> multiplier is 2 <input type="checkbox"/> <b>NO</b> multiplier is 1	Multiplier
◆	<b>TOTAL – Water Quality Functions</b>	Multiply the score from L1 by the multiplier in L2. <b>Record score on p.1 of field form.</b>
HYDROLOGIC FUNCTIONS – Indicators that wetland functions to reduce shoreline erosion.		
<b>L 3</b>	<b>Does the wetland have the potential to reduce shoreline erosion?</b>	(see p.54)
	L 3.1 Average width and characteristics of vegetation along the lakeshore ( <i>do not include aquatic bed</i> ): ( <i>choose the highest scoring description that matches conditions in the wetland</i> ) • > 3/4 of vegetation is shrubs or trees at least 33 ft. (10m) wide ..... points = 6 <input type="checkbox"/> • > 3/4 of vegetation is shrubs or trees at least 6 ft. (2m) wide ..... points = 4 <input type="checkbox"/> • > 1/4 of vegetation is shrubs or trees at least 33 ft. (10m) wide ..... points = 4 <input type="checkbox"/> • Vegetation is at least 6 ft. (2m) wide ..... points = 2 <input type="checkbox"/> • Vegetation is less than 6 ft. (2m) wide. .... points = 0 <input type="checkbox"/> <b>Aerial photo or map with Cowardin vegetation classes</b>	Figure <input type="checkbox"/>
<b>L 4</b>	<b>Does the wetland have the opportunity to reduce erosion?</b>	(see p. 55)
	Are there features along the shore that will be impacted if the shoreline erodes? <i>Note which of the following conditions apply.</i> <input type="checkbox"/> There are human structures and activities along the shore behind the wetland (buildings, fields) that can be damaged by erosion. <input type="checkbox"/> There are undisturbed natural resources along the shore (e.g. mature forests, other classes of wetland) behind the wetland that can be damaged by shoreline erosion. <input type="checkbox"/> Other _____ <input type="checkbox"/> <b>YES</b> multiplier is 2 <input type="checkbox"/> <b>NO</b> multiplier is 1	Multiplier
◆	<b>TOTAL – Hydrologic Functions</b>	Multiply the score from L3 by the multiplier L4. <b>Record score on p.1 of field form.</b>

Comments:

Wetland name or number: \_\_\_\_\_

<b>S Slope Wetlands</b>		<b>Points</b>
WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.		(only 1 score per box)
<b>S 1</b>	<b>Does the wetland have the potential to improve water quality?</b>	(see p.56)
	S 1.1 Characteristics of average slope of wetland: <ul style="list-style-type: none"> <li>• Slope is 1% or less (<i>a 1% slope has a 1 ft. vertical drop in elevation for every 100 ft. horizontal distance</i>) ..... points = 3</li> <li>• Slope is between 1% and 2% ..... points = 2</li> <li>• Slope is more than 2% but less than 5% ..... points = 1</li> <li>• Slope is 5% or greater ..... points = 0</li> </ul>	
	S 1.2 The soil 2 inches below the surface is clay or organic, or smells anoxic ( <i>use NRCS definitions of soil types</i> ). <b>YES</b> = 3 points <b>NO</b> = 0 points	
	S 1.3 Characteristics of the vegetation in the wetland that trap sediments and pollutants: <i>Choose the points appropriate for the description that best fits the vegetation in the wetland. Dense vegetation means you have trouble seeing the soil surface (&gt; 75% cover), and uncut means not grazed or mowed and plants are higher than 6 inches.</i> <ul style="list-style-type: none"> <li>• Dense, ungrazed, herbaceous vegetation &gt; 90% of the wetland unit ..... points = 6</li> <li>• Dense, ungrazed, herbaceous vegetation &gt; 1/2 of unit ..... points = 3</li> <li>• Dense, woody, vegetation &gt; 1/2 of unit ..... points = 2</li> <li>• Dense, ungrazed, herbaceous vegetation &gt; 1/4 of unit ..... points = 1</li> <li>• Does not meet any of the criteria above for herbaceous vegetation ..... points = 0</li> </ul> <p style="text-align: right;"><b>Aerial photo or map with vegetation polygons</b></p>	Figure <input type="checkbox"/>
Total for S 1		<i>Add the points in the boxes above</i>
<b>S 2</b>	<b>Does the wetland have the opportunity to improve water quality?</b> Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? <i>Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.</i> <ul style="list-style-type: none"> <li><input type="checkbox"/> Grazing in the wetland or within 150 ft</li> <li><input type="checkbox"/> Wetland is a groundwater seep within the Reclamation Area</li> <li><input type="checkbox"/> Untreated stormwater flows through the wetland</li> <li><input type="checkbox"/> Tilled fields, logging, or orchards within 150 ft. of wetland</li> <li><input type="checkbox"/> Residential, urban areas, golf courses are within 150 ft. upslope of wetland</li> <li><input type="checkbox"/> Other _____</li> </ul> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> multiplier is 2      <input type="checkbox"/> <b>NO</b> multiplier is 1</p>	(see p. 58)  Multiplier
<b>◆</b>	<b>TOTAL – Water Quality Functions</b>	Multiply the score from S1 by the multiplier in S2. <b>Record score on p.1 of field form.</b>
HYDROLOGIC FUNCTIONS – Indicators that wetland functions to reduce flooding and stream erosion.		
<b>S 3</b>	<b>Does the wetland unit have the potential to reduce flooding and stream erosion?</b>	(see p.59)
	S 3.1 Characteristics of vegetation that reduce the velocity of surface flows during storms: <i>Choose the points appropriate for the description that best fits conditions in the wetland. See questions S 1.3 for definition of dense and uncut. Rigid means that the stems of plants should be thick enough (usually &gt; 1/8 in), or dense enough to remain erect during surface flows.</i> <ul style="list-style-type: none"> <li>• Dense, uncut, <b>rigid</b> vegetation covers &gt; 90% of the area of the unit ..... points = 6 <input type="checkbox"/></li> <li>• Dense, uncut, <b>rigid</b> vegetation &gt; 1/2 – 90% area of unit ..... points = 3 <input type="checkbox"/></li> <li>• Dense, uncut, <b>rigid</b> vegetation &gt; 1/4 – 1/2 of unit ..... points = 1 <input type="checkbox"/></li> <li>• More than 1/4 of area is grazed, mowed, tilled, or vegetation is not rigid ..... points = 0 <input type="checkbox"/></li> </ul>	
	S 3.2 Characteristics of slope wetland that holds back small amounts of flood flows. The slope has small surface depressions that can retain water over at least 10% of its area. <input type="checkbox"/> <b>YES</b> = 2 points <input type="checkbox"/> <b>NO</b> = 0 points	
Total for S3		<i>Add the points in the boxes above</i>
<b>S 4</b>	<b>Does the wetland unit have the opportunity to reduce flooding and erosion? (see p. 61)</b> Answer NO if the major source of water is irrigation return flow (e.g. a seep that is on the downstream side of a dam or at the base of an irrigated field. Answer YES if the wetland is in a landscape position where the reduction in water velocity it provides helps protect downstream property and aquatic resources fro flooding or excessive and/or erosive flows. <i>Note which of the following conditions apply.</i> <ul style="list-style-type: none"> <li><input type="checkbox"/> Wetland has surface runoff that can cause flooding problems downgradient</li> <li><input type="checkbox"/> Other _____</li> </ul> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> multiplier is 2      <input type="checkbox"/> <b>NO</b> multiplier is 1</p>	Multiplier
<b>◆</b>	<b>TOTAL – Hydrologic Functions</b>	Multiply the score from S3 by S4. <b>Record score on p.1 of field form.</b>

Comments: \_\_\_\_\_

Wetland name or number: \_\_\_\_\_

<i>These questions apply to wetlands of all HGM classes.</i>		<b>Points</b>								
HABITAT FUNCTIONS – Indicators that wetland functions to provide important habitat.		(only 1 score per box)								
<b>H 1</b>	<b>Does the wetland have the potential to provide habitat for many species? (see P. 62)</b>									
<p>H 1.1 <b>Categories of Vegetation structure:</b>  <i>Check the vegetarian classes (as defined by Cowardin) and heights of emergents present. Size threshold for each class or height category is 1/4 acre or more than 10% of the area if unit is &lt; 2.5 acres.</i></p> <p><input checked="" type="checkbox"/> Aquatic bed  <input type="checkbox"/> Emergent plants 0-12 inches (0-30cm) high are the highest layer and have &gt; 30% cover  <input type="checkbox"/> Emergent plants &gt;12 – 40 inches (30 – 100cm) high are the highest layer with &gt; 30% cover  <input type="checkbox"/> Emergent plants &gt; 40 inches (&gt;100cm) high are the highest layer with &gt; 30% cover  <input type="checkbox"/> Scrub/shrub (areas where shrubs have &gt; 30% cover)  <input type="checkbox"/> Forested (areas where trees have &gt; 30% cover)</p> <p><i>Add the number of vegetation types that qualify. If you have:</i>            4 – 6 types ..... points = 3 <input checked="" type="checkbox"/>                      2 types ..... points = 1 <input type="checkbox"/>            3 types ..... points = 2 <input type="checkbox"/>                                      1 type ..... points = 0 <input type="checkbox"/></p> <p style="text-align: center;"><b>Map of Cowardin vegetation classes and areas with different heights of emergents</b></p>	<p style="text-align: right;"><b>Figure</b> <input type="checkbox"/></p> <p style="text-align: right;">3</p>									
<p>H 1.2 Is one of the vegetation types “aquatic bed?” (see p.64)</p> <p style="text-align: center;"><input checked="" type="checkbox"/> <b>YES</b> = 1 point                      <input type="checkbox"/> <b>NO</b> = 0 points</p>	<p style="text-align: right;">1</p>									
<p>H 1.3 <b>Surface Water (see p. 65)</b></p> <p>H1.3.1 Does the unit have areas of “open” water (without emergent or shrub plants) over at least 1/4 acre or 10% of its area during the spring (March – early June) OR in early fall (August – end of September)? <i>Note: answer YES for Lake-fringe wetlands.</i></p> <p style="text-align: center;"><input type="checkbox"/> YES = 3 points &amp; <b>go to H 1.4</b>                      <input type="checkbox"/> NO = go to H 1.3.2</p> <p>H 1.3.2 Does the unit have an intermittent or permanent stream within its boundaries, or along one side, over at least 1/4 acre or 10% of its area, AND that has an unvegetated bottom (answer yes only if H 1.3.1 is NO)?</p> <p style="text-align: center;"><input checked="" type="checkbox"/> YES = 3 points                                      <input type="checkbox"/> NO = 0 points</p> <p style="text-align: right;"><b>Map showing areas of open water</b></p>	<p style="text-align: right;"><b>Figure</b> <input type="checkbox"/></p> <p style="text-align: right;">3</p>									
<p>H 1.4 <b>Richness of Plant Species (see p. 66)</b></p> <p>Count the number of plant species in the wetland that cover at least 10 ft<sup>2</sup> (different patches of the same species can be combined to meet the size threshold)</p> <p><i>You do not have to name the species. Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Russian Olive, Phragmites, Canadian Thistle, Yellow-flag Iris, and Salt Cedar (Tamarisk)</i></p> <p>If you counted:</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding-right: 20px;">&gt; 9 species</td> <td>points = 2</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>4 – 9 species</td> <td>points = 1</td> <td><input type="checkbox"/></td> </tr> <tr> <td>&lt; 4 species</td> <td>points = 0</td> <td><input type="checkbox"/></td> </tr> </table> <p style="text-align: right;"># of species <u>10</u></p> <p><i>List species below if you wish: _____</i></p>	> 9 species	points = 2	<input checked="" type="checkbox"/>	4 – 9 species	points = 1	<input type="checkbox"/>	< 4 species	points = 0	<input type="checkbox"/>	<p style="text-align: right;">2</p>
> 9 species	points = 2	<input checked="" type="checkbox"/>								
4 – 9 species	points = 1	<input type="checkbox"/>								
< 4 species	points = 0	<input type="checkbox"/>								
<p>H 1.5 <b>Interspersion of Habitats (see p. 67)</b></p> <p>Decided from the diagrams below whether interspersion between types of vegetation (described in H1.1), or categories and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.</p> <div style="text-align: center;"> <p style="margin-left: 100px;">None = 0 points      Low = 1 point      Moderate = 2 points</p> <p style="margin-left: 100px;">High = 3 points      [riparian braided channels]</p> </div> <p>Note: If you have 4 or more vegetation categories or 3 vegetation categories and open water, the rating is always “high”.  <b>Use maps from H 1.1 and H 1.3</b></p>	<p style="text-align: right;"><b>Figure</b> <input type="checkbox"/></p> <p style="text-align: right;">3</p>									

Comments: \_\_\_\_\_

Wetland name or number: \_\_\_\_\_

	<p>H 1.6 <b>Special Habitat Features</b> (see p. 68)  <i>Check the habitat features that are present in the wetland unit. The number of checks is the number of points you put into the next column.</i></p> <p><input checked="" type="checkbox"/> Loose rocks larger than 4" <b>or</b> large, downed, woody debris (&gt; 4 in. diameter) within the area of surface ponding or in stream</p> <p><input type="checkbox"/> Cattails or bulrushes are present within the unit</p> <p><input type="checkbox"/> Standing snags (diameter at the bottom &gt; 4 inches) in the wetland unit or within 30m (100 ft) of the edge</p> <p><input checked="" type="checkbox"/> Emergent or shrub vegetation in areas that are permanently inundated/ponded. <i>The presence of "yellow flag" Iris is a good indicator of vegetation in areas permanently ponded.</i></p> <p><input checked="" type="checkbox"/> Stable steep banks of fine material that might be used by beaver or muskrat for denning (&gt; 45 degree slope) <b>OR</b> signs of recent beaver activity</p> <p><input type="checkbox"/> Invasive species cover less than 20% in each stratum of vegetation (<i>canopy, sub-canopy, shrubs, herbaceous, moss/ground cover</i>)</p> <p style="text-align: right;"><i>Maximum score possible = 6</i></p>	3
<p><b>H 1 TOTAL Score</b> – potential to provide habitat <span style="float: right;"><i>Add the scores in the column above</i></span></p>		<p><b>15</b></p>
<p><b>H 2</b> Does the wetland have the <u>opportunity</u> to provide habitat for many species?</p>	<p>(only 1 score per box)</p>	
	<p>H 2.1 <b>Buffers</b> (see P. 71):  <i>Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed". Relatively undisturbed also means no grazing, no landscaping, no daily human use, and no structures or paving within undisturbed part of buffer.</i></p> <p><input type="checkbox"/> 330 ft (100m) of relatively undisturbed vegetated areas, rocky areas, or open water &gt; 95% of circumference..... <b>points = 5</b></p> <p><input type="checkbox"/> 330 ft (100m) of relatively undisturbed vegetated areas, rocky areas, or open water &gt; 50% circumference..... <b>points = 4</b></p> <p><input type="checkbox"/> 170 ft (50m) of relatively undisturbed vegetated areas, rocky areas, or open water &gt; 95% circumference..... <b>points = 4</b></p> <p><input type="checkbox"/> 330 ft (100m) of relatively undisturbed vegetated areas, rocky areas, or open water &gt; 25% circumference..... <b>points = 3</b></p> <p><input checked="" type="checkbox"/> 170 ft (50m) of relatively undisturbed vegetated areas, rocky areas, or open water for &gt; 50% circumference..... <b>points = 3</b></p> <p><b>If buffer does not meet any of the three criteria above:</b></p> <p><input type="checkbox"/> No paved areas (except paved trails) or buildings within 80 ft (25m) of wetland &gt; 95% circumference. Light to moderate grazing or lawns are OK..... <b>points = 2</b></p> <p><input type="checkbox"/> No paved areas of buildings within 170 ft (50m) of wetland for &gt; 50% circumference. Light to moderate grazing or lawns are OK..... <b>points = 2</b></p> <p><input type="checkbox"/> Heavy grazing in buffer..... <b>points = 1</b></p> <p><input type="checkbox"/> Vegetated buffers are &lt; 6.6 ft wide (2m) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland)..... <b>points = 0</b></p> <p><input type="checkbox"/> Buffer does not meet any of the criteria above..... <b>points = 1</b></p>	<p>Figure <input type="checkbox"/></p> <p style="text-align: right;">3</p>
	<p>H 2.2 <b>Wet Corridors</b> (see p. 72)</p> <p>H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken, &gt; 30 ft. wide, vegetated corridor at least 1/4 mile long with surface water or water flowing water throughout most of the year (&gt; 9 months/yr?) (dams, heavily used gravel roads, paved roads, fields tilled to edge of stream, or pasture to edge of stream are considered breaks in the corridor).</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES = 4 points</b> (go to H 2.3)                  <input type="checkbox"/> <b>NO = go to H 2.2.2</b></p> <p>H. 2.2.2 Is the unit part of a relatively undisturbed and unbroken, &gt; 30 ft. wide, vegetated corridor, at least 1/4 mile long with water flowing seasonally, <b>OR</b> a lake-fringe wetland without a "wet" corridor, <b>OR</b> a riverine wetland without a surface channel connecting to the stream?</p> <p style="text-align: center;"><input checked="" type="checkbox"/> <b>YES = 2 points</b> (go to H 2.3)                  <input type="checkbox"/> <b>NO = go to H 2.2.3</b></p> <p>H. 2.2.3 Is the wetland within 1/2 mile of any permanent stream, seasonal stream, or lake (<i>do not include man-made ditches</i>)?</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES = 1 point</b>    <input type="checkbox"/> <b>NO = 0 points</b></p>	2

Comments: \_\_\_\_\_

Wetland name or number: \_\_\_\_\_

	<p>H 2.3 Near or adjacent to other priority habitats listed by WDFW (see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report <a href="http://wdfw.wa.gov/hab/phslist.htm">http://wdfw.wa.gov/hab/phslist.htm</a>). Which of the following priority habitats are within 330ft (100m) of the wetland unit?  <i>NOTE: the connections to the habitats can be disturbed.</i></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>Aspen Stands:</b> Pure or mixed stands of aspen greater than 0.4 ha (1 acre).</li> <li><input type="checkbox"/> <b>Biodiversity Areas and Corridors:</b> Areas of habitat that are relatively important to various species of native fish and wildlife (may include urban or urban growth areas) (full descriptions in WDFW PHS report p. 152).</li> <li><input type="checkbox"/> <b>Eastside Steppe:</b> Non-forested vegetation type dominated by broadleaf herbaceous flora(i.e., forbs), perennial bunchgrasses, or a combination of both (full description of species found here in WDFW PHS report p. 153).</li> <li><input type="checkbox"/> <b>Old-growth/Mature forests (east of Cascade crest):</b> (full descriptions in WDFW PHS report p. 157). Old-growth: Stands are &gt; 150 yrs in age; may be variable in tree species composition and structural characteristics due to the influence of fire, climate, and soils. Mature: Stands 80 – 160 yrs old. Decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth.</li> <li><input type="checkbox"/> <b>Oregon white Oak:</b> Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (full descriptions in WDFW PHS report p. 158).</li> <li><input type="checkbox"/> <b>Juniper Savannah:</b> All juniper woodlands (SE part of state only; check map)</li> <li><input type="checkbox"/> <b>Shrub-steppe:</b> A nonforested vegetation type consisting of one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of shrubs (see Eastside Steppe for sites with little or no shrub cover).</li> <li><input checked="" type="checkbox"/> <b>Riparian:</b> The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.</li> <li><input type="checkbox"/> <b>Inland Dunes</b> This placeholder is for a new priority habitat that will capture areas known as Inland Dunes. A definition will be developed later in Fall 2008. (check WDFW web site)</li> <li><input checked="" type="checkbox"/> <b>Instream:</b> The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.</li> <li><input type="checkbox"/> <b>Caves:</b> A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.</li> <li><input type="checkbox"/> <b>Cliffs:</b> Greater than 7.6 m (25 ft) high and occurring below 5000 ft.</li> <li><input type="checkbox"/> <b>Talus:</b> Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.</li> <li><input type="checkbox"/> <b>Snags and Logs:</b> Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of &gt; 30 cm (12 in) in eastern Washington and are &gt; 2 m (6.5 ft) in height. Priority logs are &gt; 30 cm (12 in) in diameter at the largest end, and &gt; 6 m (20 ft) long.</li> </ul> <p style="text-align: right;">If wetland has <b>2 or more</b> Priority Habitats = <b>4 points</b>          If wetland has <b>1</b> Priority Habitat = <b>2 points</b>          No Priority habitats = <b>0 points</b></p> <p><i>Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in H 2.4)</i></p>	4
	<p>H 2.4 <u>Landscape:</u> Choose the <b>one</b> description of the landscape around the wetland that best fits. (see p. 76)</p> <ul style="list-style-type: none"> <li>• The wetland unit is in an area where annual rainfall is less than 12 inches, and its water regime is not influenced by irrigation practices, dams, or water control structures. (Generally, this means outside boundaries of reclamation areas, irrigation district, or reservoirs.)..... points = 5 <input type="checkbox"/></li> <li>• There are at least 3 other wetlands within 1/2 mile, and the connections between them are relatively undisturbed (light grazing in the connection or an open water connection along a lake shore without heavy boat traffic are OK, but connections should NOT be bisected by paved roads, fill, fields, heavy boat traffic or other development. .... points = 5 <input type="checkbox"/></li> <li>• There are at least 3 other wetlands within 1/2 mile, BUT the connections between them are disturbed. .... points = 2 <input checked="" type="checkbox"/></li> <li>• There is at least 1 wetland within 1/2 mile ..... points = 1 <input type="checkbox"/></li> <li>• Does not meet any of the four criteria above ..... points = 0 <input type="checkbox"/></li> </ul>	2
<b>H 2 TOTAL Score – opportunity for providing habitat</b> <i>Add the scores in the columns above</i>		<b>11</b>
<b>H 3 Does the wetland unit have indicators that its ability to provide habitat is reduced?</b>		
	<p>H 3.1 <u>Indicator of reduced habitat functions</u> (see p. 75)          Do the areas of open water in the wetland unit have a resident population of carp (see text for indicators of the presence of carp)? Note: This question does not apply to reservoirs with water levels controlled by dams, such as the reservoirs on the Columbia and Snake Rivers.  <input type="checkbox"/> <b>YES = 5 points</b> <input checked="" type="checkbox"/> <b>NO = 0 points</b></p>	<i>Points will be subtracted</i> 0
<b>◆ Total Score for Habitat Functions</b> <i>Add the points for H 1, H 2 and H 3; and record the result on p. 1</i>		<b>26</b>

Comments: \_\_\_\_\_

Wetland name or number: \_\_\_\_\_

### CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

*Please determine if the wetland meets the attributes described below and circle the appropriate Category. NOTE: A wetland may meet the criteria for more than one set of special characteristics. Record all those that apply. NOTE: All units should also be characterized based on their functions.*

<b>Wetland Type</b> – Check off any criteria that apply to the wetland. Circle the Category when the appropriate criteria are met.	
<b>SC1</b>	<p><b>Vernal pools</b> (see p.79)</p> <p>Is the wetland unit <b>less than 4,000 ft<sup>2</sup></b>, and does it meet at least <b>two</b> of the following criteria?</p> <p><input type="checkbox"/> Its only source of water is rainfall or snowmelt from a small contributing basin and has no groundwater input.</p> <p><input type="checkbox"/> Wetland plants are typically present only in the spring; the summer vegetation is typically upland annuals. <i>NOTE: If you find perennial, “obligate”, wetland plants the wetland is probably NOT a vernal pool.</i></p> <p><input type="checkbox"/> The soil in the wetland are shallow (&lt;1 ft. deep (30cm) and is underlain by an impermeable layer such as basalt or clay.</p> <p><input type="checkbox"/> Surface water is present for less than 120 days during the “wet” season.</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> = Go to SC 1.1                      <input checked="" type="checkbox"/> <b>NO</b> not a vernal pool</p>
	<p>SC 1.1 Is the vernal pool relatively undisturbed in February and March?</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> = Go to SC 1.2                      <input type="checkbox"/> <b>NO</b> = not a vernal pool with special characteristics</p>
	<p>SC 1.2 Is the vernal pool in an area where there are at least 3 separate aquatic resources within 0.5 miles (other wetlands, rivers, lakes etc.)?</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> = Category II                      <input type="checkbox"/> <b>NO</b> = Category III</p> <p style="text-align: right;"><input type="checkbox"/> <b>Cat. II</b> <input type="checkbox"/> <b>Cat. III</b></p>
<b>SC2</b>	<p><b>Alkali wetlands</b> (see p.81)</p> <p>Does the wetland unit meet <b>one</b> of the following two criteria?</p> <p><input type="checkbox"/> The wetland has a conductivity &gt; 3.0 mS/cm.</p> <p><input type="checkbox"/> The wetland has a conductivity between 2.0 – 3.0 mS, and more than 50% of the plant cover in the wetland can be classified as “alkali” species (see Table 2 for list of plants found in alkali systems).</p> <p><input type="checkbox"/> If the wetland is dry at the time of your field visit, the central part of the area is covered with a layer of salt.</p> <p><b>OR</b> does the wetland meet <b>two</b> of the following three sub-criteria?</p> <p><input type="checkbox"/> Salt encrustations around more than 80% of the edge of the wetland.</p> <p><input type="checkbox"/> More than 3/4 of the plant cover consists of species listed on Table 2.</p> <p><input type="checkbox"/> A pH above 9.0. All alkali wetlands have a high pH, but please note that some freshwater wetlands may also have a high pH. Thus, pH alone is not a good indicator of alkali wetlands.</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> = Category I                      <input checked="" type="checkbox"/> <b>NO</b> – not an alkali wetland</p> <p style="text-align: right;"><b>Cat. I</b> <input type="checkbox"/></p>
<b>SC3</b>	<p><b>Natural Heritage Wetlands</b> (see p. 82)</p> <p>Natural Heritage wetlands have been identified by the Washington Natural Heritage Program/DNR as either high quality undisturbed wetlands or wetlands that support state Threatened, Endangered, or Sensitive plant species.</p> <p>SC 3.1 Is the wetland unit being rated in a Section/Township/Range that contains a natural heritage wetland? (This question is used to screen out most sites before you need to contact WNHP/DNR.)</p> <p>S/T/R information from Appendix D <input type="checkbox"/> or accessed from WNHP/DNR web site <input type="checkbox"/></p> <p style="text-align: center;"><b>YES</b> <input type="checkbox"/> Contact WNHP/DNR (see p. 79) and go to SC 3.2                      <b>NO</b> <input type="checkbox"/></p> <p>SC 3.2 Has DNR identified the wetland unit as a high quality undisturbed wetland or as a site with state threatened or endangered plant species?</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> = Category I                      <input checked="" type="checkbox"/> <b>NO</b> – not a natural heritage wetland</p> <p style="text-align: right;"><b>Cat. I</b> <input type="checkbox"/></p>

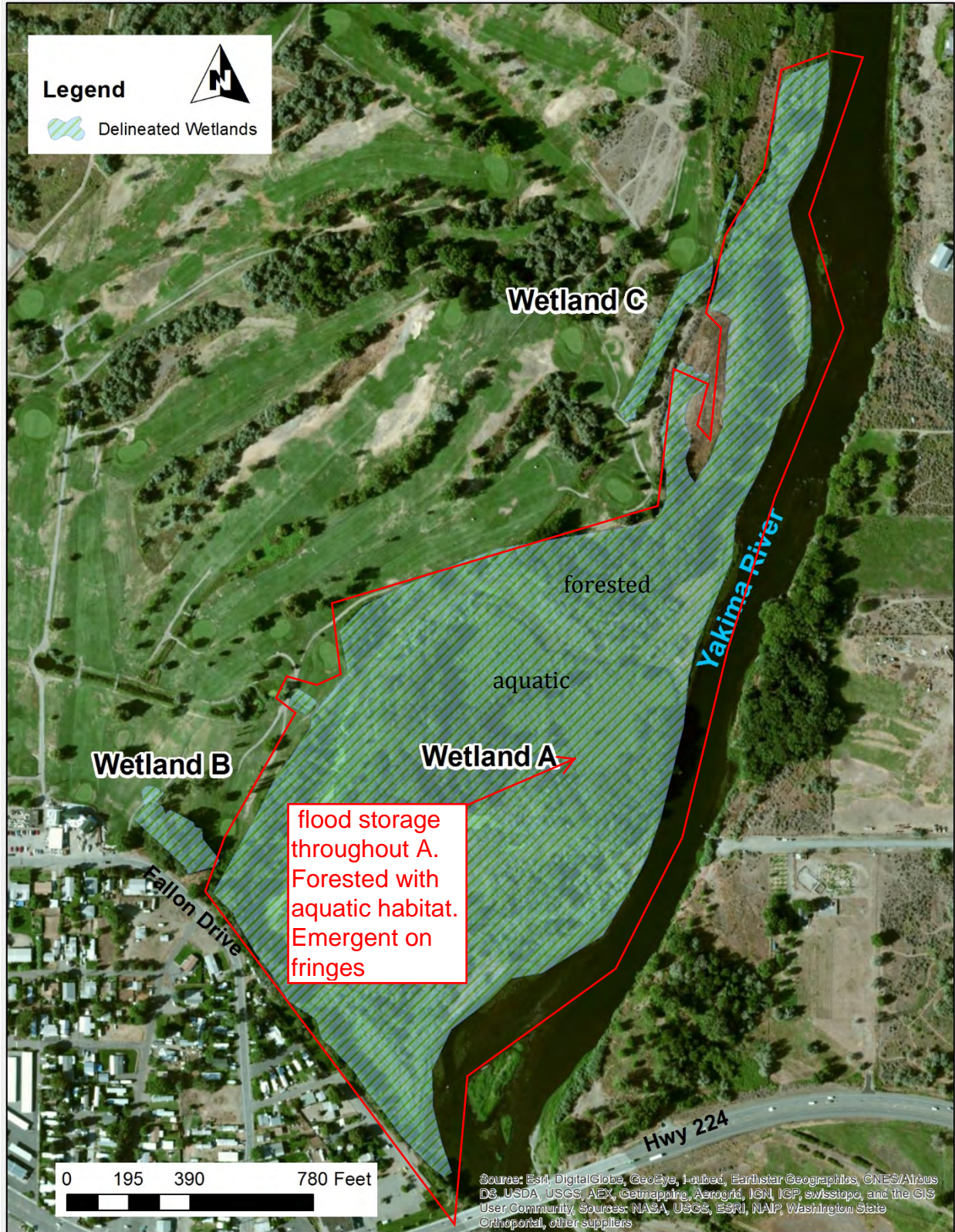


Wetland name or number: \_\_\_\_\_

SC4	<p><b>Bogs</b> (see p. 82)</p> <p>Does the wetland unit (<b>or any part of the wetland unit</b>) meet both the criteria for soils and vegetation in bogs? Use the key below to identify if the wetland is a bog. <i>If you answer yes you will still need to rate the wetland based on its functions.</i></p> <p>SC 4.1 Does the wetland have organic soil horizons (i.e. layers of organic soil), either peats or mucks, that compose 16 inches or more of the first 32 inches of the soil profile? (See Appendix B for a field key to identify organic soils.)  <input type="checkbox"/> <b>YES</b> = go to SC 4.3      <input type="checkbox"/> <b>NO</b> = go to SC 4.2</p> <p>SC 4.2 Does the wetland have organic soils, either peats or mucks that are less than 16 inches deep over bedrock or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond?    <input type="checkbox"/> <b>YES</b> = go to 4.3      <input type="checkbox"/> <b>NO</b> = Is not a bog for rating</p> <p>SC 4.3 Does the wetland have more than 70% cover of mosses at ground level in any area within its boundaries, AND other plants, if present, consist of the “bog” species listed in Table 3 as a significant component of the vegetation (more than 30% of the total shrub and herbaceous cover consists of species in Table 3)?  <input type="checkbox"/> <b>YES</b> = Category I bog      <input type="checkbox"/> <b>NO</b> = go to question 4.4</p> <p>NOTE: <i>If you are uncertain about the extent of mosses in the understory you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16” deep. If the pH is less than 5.0 and the “bog” plant species in Table 3 are present, the wetland is a bog.</i></p> <p>SC 4.4 Is the unit, or any part of it, forested (&gt; 30% cover) with sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Englemann’s spruce, or western white pine, WITH any of the species (or combination of species) on the bog species plant list in Table 3 as a significant component of the ground cover (&gt; 30% coverage of the total shrub/herbaceous cover)?  <input type="checkbox"/> <b>YES</b> = Category 1 bog      <input checked="" type="checkbox"/> <b>NO</b></p>	<p style="text-align: right;"><b>Cat. I</b> <input type="checkbox"/></p>
SC5	<p><b>Forested Wetlands</b> (see p. 85)</p> <p>Does the wetland unit have an area of forest (<i>you should have identified a forested class, if present, in question H 1.1</i>) rooted within its boundary that meet <b>at least one</b> of the following three criteria?  <input checked="" type="checkbox"/> The wetland is within the “100 year” floodplain of a river or stream.  <input type="checkbox"/> Aspen (<i>Populus tremuloides</i>) are a dominant or co-dominant of the “woody” vegetation. (<i>Dominant means it represents at least 50% of the cover of woody species, co-dominant means it represents at least 20% of the total cover of woody species.</i>)  <input type="checkbox"/> There is at least 1/4 acre of trees (even in wetlands smaller than 2.5 acres) that are “mature” or “old-growth” according to the definitions for these priority habitats developed by WDFW (<i>see p. 83</i>).  <input checked="" type="checkbox"/> <b>YES</b> = go to SC 5.1      <input type="checkbox"/> <b>NO</b> – not a forested wetland with special characteristics</p>	
	<p>SC 5.1 Does the wetland unit have a forest canopy where more than 50% of the tree species (by cover) are slow growing native trees? Slow growing trees are: western red cedar (<i>Thuja plicata</i>), Alaska yellow cedar (<i>Chamaecyparis nootkatensis</i>), pine spp. mostly “white” pine (<i>Pinus monticola</i>), western hemlock (<i>Tsuga heterophylla</i>), Englemann spruce (<i>Picea engelmannii</i>)?  <input type="checkbox"/> <b>YES</b> = Category I      <input checked="" type="checkbox"/> <b>NO</b> = go to SC 5.2</p>	<p style="text-align: right;"><b>Cat. I</b> <input type="checkbox"/></p>
	<p>SC 5.2 Does the unit have areas where aspen (<i>Populus tremuloides</i>) as a dominant or co-dominant species?  <input type="checkbox"/> <b>YES</b> = Category I      <input checked="" type="checkbox"/> <b>NO</b> = go to SC 5.3</p>	<p style="text-align: right;"><b>Cat. I</b> <input type="checkbox"/></p>
	<p>SC 5.3 Does the wetland unit have a forest canopy where more than 50% of the tree species (by cover) are fast growing species? Fast growing species are: Alders – red (<i>alnus rubra</i>), thin-leaf (<i>A. tenuifolia</i>); Cottonwoods – narrow-leaf (<i>Populus angustifolia</i>), black (<i>P. balsamifera</i>); Willows – peach-leaf (<i>Salix amygdaloides</i>), Sitka (<i>S. sitchensis</i>), Pacific (<i>S. lasiandra</i>), Aspen – <i>Populus tremuloides</i>, Water Birch (<i>Betula occidentalis</i>)  <input type="checkbox"/> <b>YES</b> = Category II      <input checked="" type="checkbox"/> <b>NO</b> = go to SC 5.5</p>	<p style="text-align: right;"><b>Cat. II</b> <input type="checkbox"/></p>
	<p>SC 5.5 Is the forested component of the wetland within the “100 year floodplain” of a river or stream?  <input checked="" type="checkbox"/> <b>YES</b> = Category II</p>	<p style="text-align: right;"><b>Cat. II</b> <input checked="" type="checkbox"/></p>
◆	<p><b>Category of wetland based on Special Characteristics</b></p> <p style="text-align: center;"><i>Choose the “highest” rating if wetland falls into several categories. If you answered <b>NO</b> for all types enter “Not Applicable” on p. 1</i></p>	<p style="text-align: center;"><b>II</b></p>

Figure 1

Wetland Assessment Unit Wetland A



Wetland name or number: \_\_\_\_\_

**WETLAND RATING FORM – EASTERN WASHINGTON**

Version 2 – Updated July 2006 to increase accuracy and reproducibility among users –  
Updated Oct. 2008 with the new WDFW definitions for priority habitats

Name of wetland (if known): B

Date of site visit: 11/1/14

Rated by: M. Anderson

Trained by Ecology?  Yes  No

Date of training: 09/2011

SEC: 32

TWNSHP: 10N

RNGE: 28E

Is S/T/R in Appendix D?  Yes  No

Map of wetland unit: Figure \_\_\_\_\_ Estimated size \_\_\_\_\_

**SUMMARY OF RATING**

Category based on FUNCTIONS provided by wetland:  I  II  III  IV

Category I =	Score > 70
Category II =	Score 51 - 69
Category III =	Score 30 - 50
Category IV =	Score < 30

Score for “Water Quality” Functions

**20**

Score for Hydrologic Functions

**32**

Score for Habitat Functions

**13**

TOTAL score for Functions

**65**

Category based on SPECIAL CHARACTERISTICS of Wetland:  I  II  III  Does not Apply

**Final Category** (choose the “highest” category from above)

**II**

**Summary of basic information about the wetland unit.**

Wetland Type		Wetland Class	
Vernal Pool	<input type="checkbox"/>	Depressional	<input type="checkbox"/>
Alkali	<input type="checkbox"/>	Riverine	<input checked="" type="checkbox"/>
Natural Heritage Wetland	<input type="checkbox"/>	Lake-fringe	<input type="checkbox"/>
Bog	<input type="checkbox"/>	Slope	<input type="checkbox"/>
Forest	<input checked="" type="checkbox"/>	Check if unit has multiple HGM classes present	<input type="checkbox"/>
None of the above	<input checked="" type="checkbox"/>		

**Does the wetland being rated meet any of the criteria below?**

If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands that Need Special and that are Not Included in the Rating	YES	NO
SP1. <i>Has the wetland unit been documented as a habitat for any Federally listed Threatened or Endangered animal or plant species (T/E species)?</i> For the purposes of this rating system, “documented” means the wetland is on the appropriate state or federal database.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SP2. <i>Has the wetland unit been documented as habitat for any State listed Threatened or Endangered animal species?</i> For the purposes of this rating system, “documented” means the wetland is on the appropriate state database. Note: Wetlands with State listed plant species are categorized as Category 1 Natural Heritage Wetlands (see p. 19 of data form).	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SP3. <i>Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SP4. <i>Does the wetland unit have a local significance in addition to its functions?</i> For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.**

The hydrogeomorphic classification groups wetlands into those that function in similar ways. Classifying the wetland first simplifies the questions needed to answer how it functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 20 for more detailed instructions on classifying wetlands.

Wetland name or number: \_\_\_\_\_

### Classification of Vegetated Wetlands for Eastern Washington

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Does the entire wetland unit **meet both** of the following criteria?

- The vegetated part of the wetland is on the shores of a body of open water (without any vegetation on the surface) where at least 20 acres (8 ha) in size;
- At least 30% of the open water area is deeper than 3 m (10 ft)?

NO – go to Step 2       YES – The wetland class is **Lake-fringe (lacustrine fringe)**

2. Does the wetland unit **meet all** of the following criteria?

- The wetland is on a slope (*slope can be very gradual*).
  - The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.
  - The water leaves the wetland **without being impounded**?
- NOTE: *Surface water does not pond in these types of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than a foot deep).*

NO – go to Step 3       YES – The wetland class is **Slope**

3. Is the wetland unit in a valley or stream channel where it gets inundated by overbank flooding from that stream or river? In general, the flooding should occur at least once every ten years to answer “yes”. *The wetland can contain depressions that are filled with water when the river is not flooding.*

NO – go to Step 4       YES – The wetland class is **Riverine**

4. Is the wetland unit in a topographic depression, outside areas that are inundated by overbank flooding, in which water ponds, or is saturated to the surface, at some time of the year. *This means that any outlet, if present is higher than the interior of the wetland.*

NO – go to Step 5       YES – The wetland class is **Depressional**

5. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. **GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT** (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the class listed in column 2 is less than 10% of the unit, classify the wetland using the class that represents more than 90% of the total area.

<i>HGM Classes Within One Delineated Wetland Boundary</i>	<i>Class to Use for Rating</i>
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine (riverine is within boundary of depression)	Depressional
Depressional + Lake-fringe	Depressional

If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.



Wetland name or number: \_\_\_\_\_

<b>R Riverine Wetlands</b>		<b>Points</b>
WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.		(only 1 score per box)
<b>R 1</b>	<b>Does the wetland unit have the potential to improve water quality?</b>	(see p.45)
	R 1.1 Area of surface depressions within the riverine wetland that can trap sediments during a flooding event: <ul style="list-style-type: none"> <li>• Depressions cover &gt; 1/3 area of wetland ..... points = 6 <input type="checkbox"/></li> <li>• Depressions cover &gt; 1/10 area of wetland ..... points = 3 <input type="checkbox"/></li> <li style="padding-left: 20px;"><b>If depressions &gt; 1/10<sup>th</sup> of area of unit draw polygons on aerial photo or map.</b></li> <li>• Depressions present but cover &lt; 1/10 area of wetland ..... points = 1 <input type="checkbox"/></li> <li>• No depressions present ..... points = 0 <input type="checkbox"/></li> </ul>	Figure <input type="checkbox"/>
	R 1.2 Characteristics (cover) of the vegetation in the unit ( <i>area of polygons with &gt; 90% cover at person height. This is not Cowardin vegetation classes</i> ): <ul style="list-style-type: none"> <li>• Forest or shrub &gt; 2/3 the area of the wetland..... points =10 <input type="checkbox"/></li> <li>• Forest or shrub 1/3 – 2/3 area of the wetland..... points = 5 <input type="checkbox"/></li> <li>• Ungrazed, herbaceous plants &gt; 2/3 area of wetland ..... points = 5 <input type="checkbox"/></li> <li>• Ungrazed herbaceous plants 1/3 – 2/3 area of wetland ..... points = 2 <input type="checkbox"/></li> <li>• Forest, shrub, and ungrazed herbaceous &lt; 1/3 area of wetland ..... points = 0 <input type="checkbox"/></li> </ul> <p style="text-align: center;"><b>Aerial photo or map showing polygons of different vegetation cover</b></p>	Figure <input type="checkbox"/>
Total for R1		Add the points in the boxes above
<b>R 2</b>	<b>Does the wetland have the opportunity to improve water quality?</b>	(see p. 46)
	Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. <i>Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.</i> <ul style="list-style-type: none"> <li><input type="checkbox"/> Grazing in the wetland or within 150 ft               <ul style="list-style-type: none"> <li><input type="checkbox"/> Wetland intercepts groundwater within the Reclamation Area</li> <li><input type="checkbox"/> Untreated stormwater flows into wetland</li> <li><input type="checkbox"/> Tilled fields or orchards within 150 ft. of wetland</li> <li><input type="checkbox"/> Water flows into wetland from a stream or culvert that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging</li> <li><input type="checkbox"/> Residential or urban areas are within 150 ft. of wetland</li> <li><input type="checkbox"/> The river or stream that floods the wetland has a contributing basin where human activities have raised levels of sediment, toxic compounds or nutrients in the river water above water quality standards.</li> </ul> </li> <li><input type="checkbox"/> Other _____</li> </ul> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> multiplier is 2      <input type="checkbox"/> <b>NO</b> multiplier is 1</p>	Multiplier
<b>◆ TOTAL – Water Quality Functions</b> Multiply the score from R1 by the multiplier in R2; then <b>record score on p.1 of field form.</b>		_____
HYDROLOGIC FUNCTIONS – Indicators that wetland functions to reduce flooding and stream degradation.		
<b>R 3</b>	<b>Does the wetland have the potential to reduce flooding and erosion?</b>	(see p.47)
	R 3.1 Amount overbank storage the wetland provides: <i>Estimate the average width of the wetland perpendicular to the direction of the flow of water and the width of the stream or river channel (distance between banks). Calculate the ratio: width of wetland / width of stream.</i> <ul style="list-style-type: none"> <li>• If the ratio is 2 or more ..... points =10 <input type="checkbox"/></li> <li>• If the ratio is between 1 and &lt; 2 ..... points = 8 <input type="checkbox"/></li> <li>• If the ratio is 1/2 to &lt; 1 ..... points = 4 <input type="checkbox"/></li> <li>• If the ratio is 1/4 to &lt; 1/2 ..... points = 2 <input type="checkbox"/></li> <li>• If the ratio is &lt; 1/4 ..... points = 1 <input type="checkbox"/></li> </ul> <p style="text-align: center;"><b>Aerial photo or map showing average widths</b></p>	Figure <input type="checkbox"/>
	R 3.2 Characteristics of vegetation that slow down water velocities during floods: <i>Treat large woody debris as "forest or shrub" (areas of polygons with &gt; 90% cover at person height. This is not Cowardin vegetation classes)</i> : <ul style="list-style-type: none"> <li>• Forest or shrub for more than 2/3 the area of the wetland..... points = 6 <input type="checkbox"/></li> <li>• Forest or shrub for &gt; 1/3 area OR herbaceous plants &gt; 2/3 area..... points = 4 <input type="checkbox"/></li> <li>• Forest or shrub for &gt; 1/10 area OR herbaceous plants &gt; 1/3 area..... points = 2 <input type="checkbox"/></li> <li>• Vegetation does not meet above criteria ..... points = 0 <input type="checkbox"/></li> </ul> <p style="text-align: center;"><b>Aerial photo or map showing polygons of different vegetation types</b></p>	Figure <input type="checkbox"/>
Total for R3		Add the points in the boxes above
<b>R 4</b>	<b>Does the wetland have the opportunity to reduce flooding and erosion?</b>	(see p.50)
	Answer NO if the major source of water is irrigation return flow or water levels are controlled by a reservoir. Answer YES if the wetland is in a location in the watershed where the flood storage, or reduction in water velocity it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. <i>Note which of the following conditions apply.</i> <ul style="list-style-type: none"> <li><input type="checkbox"/> There are human structures and activities downstream (roads, buildings, bridges, farms) that can be damaged by flooding.</li> <li><input type="checkbox"/> There are natural resources downstream (e.g. salmon redds) that can be damaged by flooding</li> <li><input type="checkbox"/> Other _____</li> </ul> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> multiplier is 2      <input type="checkbox"/> <b>NO</b> multiplier is 1</p>	Multiplier
<b>◆ TOTAL – Hydrologic Functions</b> Multiply the score from R3 by the multiplier in R4. <b>Record score on p.1 of field form.</b>		_____

Wetland name or number: \_\_\_\_\_

<b>L Lake-fringe Wetlands</b>		<b>Points</b>
WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.		(only 1 score per box)
<b>L 1</b>	<b>Does the wetland have the potential to improve water quality?</b>	(see p.52)
	L 1.1 Average width of vegetation along the lakeshore: • Vegetation is more than 33 ft. (10m) wide ..... points = 6 <input type="checkbox"/> • Vegetation is more than 16 ft.(5m) wide and < 33 ft wide ..... points = 3 <input type="checkbox"/> • Vegetation is 6 ft. (2m) wide to < 16 ft wide ..... points = 1 <input type="checkbox"/> <b>Map of Cowardin classes with widths marked</b>	Figure <input type="checkbox"/>
	L 1.2 Characteristics of the vegetation in the wetland: <i>Choose the appropriate description that results in the highest points, and do not include any open water in your estimate of coverage. The herbaceous plants can be either the dominant form or as an understory in a shrub or forest community. These are not Cowardin classes. Area of Cover is total cover in the unit, but it can be in patches. NOTE: Herbaceous does not include aquatic bed.</i> • Herbaceous plants cover > 90% of the vegetated area ..... points = 6 <input type="checkbox"/> • Herbaceous plants cover > 2/3 of the vegetated area ..... points = 4 <input type="checkbox"/> • Herbaceous plants cover > 1/3 of the vegetated area ..... points = 3 <input type="checkbox"/> • Other vegetation that is not aquatic bed in > 2/3 vegetated area ..... points = 3 <input type="checkbox"/> • Other vegetation that is not aquatic bed in > 1/3 vegetated area ..... points = 1 <input type="checkbox"/> • Aquatic bed cover > 2/3 of the vegetated area ..... points = 0 <input type="checkbox"/> <b>Map with polygons of different vegetation types</b>	Figure <input type="checkbox"/>
Total for L1		Add the points in the boxes above
<b>L 2</b>	<b>Does the wetland have the opportunity to improve water quality?</b>	(see p.53)
	Answer YES if you know or believe there are pollutants in the lake water, or surface water flowing through the wetland to the lake is polluted. <i>Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.</i> <input type="checkbox"/> Wetland is along the shores of a lake or reservoir that does not meet water quality standards <input type="checkbox"/> Grazing in the wetland or within 150 ft <input type="checkbox"/> Untreated stormwater flows into the wetland <input type="checkbox"/> Tilled fields or orchards within 150 ft. of wetland <input type="checkbox"/> Residential or urban areas are within 150 ft. of wetland <input type="checkbox"/> Powerboats with gasoline or diesel engines use the lake <input type="checkbox"/> Parks with grassy areas that are maintained, ballfields, golf courses (all within 150 ft. of shore of lake) <input type="checkbox"/> Other _____	Multiplier
	<input type="checkbox"/> <b>YES</b> multiplier is 2 <input type="checkbox"/> <b>NO</b> multiplier is 1	
◆	<b>TOTAL – Water Quality Functions</b>	Multiply the score from L1 by the multiplier in L2. <b>Record score on p.1 of field form.</b>
HYDROLOGIC FUNCTIONS – Indicators that wetland functions to reduce shoreline erosion.		
<b>L 3</b>	<b>Does the wetland have the potential to reduce shoreline erosion?</b>	(see p.54)
	L 3.1 Average width and characteristics of vegetation along the lakeshore ( <i>do not include aquatic bed</i> ): ( <i>choose the highest scoring description that matches conditions in the wetland</i> ) • > 3/4 of vegetation is shrubs or trees at least 33 ft. (10m) wide ..... points = 6 <input type="checkbox"/> • > 3/4 of vegetation is shrubs or trees at least 6 ft. (2m) wide ..... points = 4 <input type="checkbox"/> • > 1/4 of vegetation is shrubs or trees at least 33 ft. (10m) wide ..... points = 4 <input type="checkbox"/> • Vegetation is at least 6 ft. (2m) wide ..... points = 2 <input type="checkbox"/> • Vegetation is less than 6 ft. (2m) wide. .... points = 0 <input type="checkbox"/> <b>Aerial photo or map with Cowardin vegetation classes</b>	Figure <input type="checkbox"/>
<b>L 4</b>	<b>Does the wetland have the opportunity to reduce erosion?</b>	(see p. 55)
	Are there features along the shore that will be impacted if the shoreline erodes? <i>Note which of the following conditions apply.</i> <input type="checkbox"/> There are human structures and activities along the shore behind the wetland (buildings, fields) that can be damaged by erosion. <input type="checkbox"/> There are undisturbed natural resources along the shore (e.g. mature forests, other classes of wetland) behind the wetland that can be damaged by shoreline erosion. <input type="checkbox"/> Other _____	Multiplier
	<input type="checkbox"/> <b>YES</b> multiplier is 2 <input type="checkbox"/> <b>NO</b> multiplier is 1	
◆	<b>TOTAL – Hydrologic Functions</b>	Multiply the score from L3 by the multiplier L4. <b>Record score on p.1 of field form.</b>

Comments:

Wetland name or number: \_\_\_\_\_

<b>S Slope Wetlands</b>		<b>Points</b>
WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.		(only 1 score per box)
<b>S 1</b>	<b>Does the wetland have the potential to improve water quality?</b>	(see p.56)
	S 1.1 Characteristics of average slope of wetland: <ul style="list-style-type: none"> <li>• Slope is 1% or less (<i>a 1% slope has a 1 ft. vertical drop in elevation for every 100 ft. horizontal distance</i>) ..... points = 3</li> <li>• Slope is between 1% and 2% ..... points = 2</li> <li>• Slope is more than 2% but less than 5% ..... points = 1</li> <li>• Slope is 5% or greater ..... points = 0</li> </ul>	
	S 1.2 The soil 2 inches below the surface is clay or organic, or smells anoxic ( <i>use NRCS definitions of soil types</i> ). <b>YES</b> = 3 points <b>NO</b> = 0 points	
	S 1.3 Characteristics of the vegetation in the wetland that trap sediments and pollutants: <i>Choose the points appropriate for the description that best fits the vegetation in the wetland. Dense vegetation means you have trouble seeing the soil surface (&gt; 75% cover), and uncut means not grazed or mowed and plants are higher than 6 inches.</i> <ul style="list-style-type: none"> <li>• Dense, ungrazed, herbaceous vegetation &gt; 90% of the wetland unit ..... points = 6</li> <li>• Dense, ungrazed, herbaceous vegetation &gt; 1/2 of unit ..... points = 3</li> <li>• Dense, woody, vegetation &gt; 1/2 of unit ..... points = 2</li> <li>• Dense, ungrazed, herbaceous vegetation &gt; 1/4 of unit ..... points = 1</li> <li>• Does not meet any of the criteria above for herbaceous vegetation ..... points = 0</li> </ul> <p style="text-align: right;"><b>Aerial photo or map with vegetation polygons</b></p>	Figure <input type="checkbox"/>
Total for S 1		<i>Add the points in the boxes above</i>
<b>S 2</b>	<b>Does the wetland have the opportunity to improve water quality?</b> Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? <i>Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.</i> <ul style="list-style-type: none"> <li><input type="checkbox"/> Grazing in the wetland or within 150 ft</li> <li><input type="checkbox"/> Wetland is a groundwater seep within the Reclamation Area</li> <li><input type="checkbox"/> Untreated stormwater flows through the wetland</li> <li><input type="checkbox"/> Tilled fields, logging, or orchards within 150 ft. of wetland</li> <li><input type="checkbox"/> Residential, urban areas, golf courses are within 150 ft. upslope of wetland</li> <li><input type="checkbox"/> Other _____</li> </ul> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> multiplier is 2                      <input type="checkbox"/> <b>NO</b> multiplier is 1</p>	(see p. 58)  Multiplier
<b>◆</b>	<b>TOTAL – Water Quality Functions</b>	Multiply the score from S1 by the multiplier in S2. <b>Record score on p.1 of field form.</b>
HYDROLOGIC FUNCTIONS – Indicators that wetland functions to reduce flooding and stream erosion.		
<b>S 3</b>	<b>Does the wetland unit have the potential to reduce flooding and stream erosion?</b>	(see p.59)
	S 3.1 Characteristics of vegetation that reduce the velocity of surface flows during storms: <i>Choose the points appropriate for the description that best fits conditions in the wetland. See questions S 1.3 for definition of dense and uncut. Rigid means that the stems of plants should be thick enough (usually &gt; 1/8 in), or dense enough to remain erect during surface flows.</i> <ul style="list-style-type: none"> <li>• Dense, uncut, <b>rigid</b> vegetation covers &gt; 90% of the area of the unit ..... points = 6 <input type="checkbox"/></li> <li>• Dense, uncut, <b>rigid</b> vegetation &gt; 1/2 – 90% area of unit ..... points = 3 <input type="checkbox"/></li> <li>• Dense, uncut, <b>rigid</b> vegetation &gt; 1/4 – 1/2 of unit ..... points = 1 <input type="checkbox"/></li> <li>• More than 1/4 of area is grazed, mowed, tilled, or vegetation is not rigid ..... points = 0 <input type="checkbox"/></li> </ul>	
	S 3.2 Characteristics of slope wetland that holds back small amounts of flood flows. The slope has small surface depressions that can retain water over at least 10% of its area. <input type="checkbox"/> <b>YES</b> = 2 points <input type="checkbox"/> <b>NO</b> = 0 points	
Total for S3		<i>Add the points in the boxes above</i>
<b>S 4</b>	<b>Does the wetland unit have the opportunity to reduce flooding and erosion? (see p. 61)</b> Answer NO if the major source of water is irrigation return flow (e.g. a seep that is on the downstream side of a dam or at the base of an irrigated field. Answer YES if the wetland is in a landscape position where the reduction in water velocity it provides helps protect downstream property and aquatic resources fro flooding or excessive and/or erosive flows. <i>Note which of the following conditions apply.</i> <ul style="list-style-type: none"> <li><input type="checkbox"/> Wetland has surface runoff that can cause flooding problems downgradient</li> <li><input type="checkbox"/> Other _____</li> </ul> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> multiplier is 2                      <input type="checkbox"/> <b>NO</b> multiplier is 1</p>	Multiplier
<b>◆</b>	<b>TOTAL – Hydrologic Functions</b>	Multiply the score from S3 by S4. <b>Record score on p.1 of field form.</b>

Comments: \_\_\_\_\_



Wetland name or number: \_\_\_\_\_

<i>These questions apply to wetlands of all HGM classes.</i>		<b>Points</b>
HABITAT FUNCTIONS – Indicators that wetland functions to provide important habitat.		(only 1 score per box)
<b>H 1</b>	<b>Does the wetland have the potential to provide habitat for many species? (see P. 62)</b>	
	<p>H 1.1 <b>Categories of Vegetation structure:</b>  <i>Check the vegetarian classes (as defined by Cowardin) and heights of emergents present. Size threshold for each class or height category is 1/4 acre or more than 10% of the area if unit is &lt; 2.5 acres.</i></p> <p><input type="checkbox"/> Aquatic bed  <input checked="" type="checkbox"/> Emergent plants 0-12 inches (0-30cm) high are the highest layer and have &gt; 30% cover  <input type="checkbox"/> Emergent plants &gt;12 – 40 inches (30 – 100cm) high are the highest layer with &gt; 30% cover  <input type="checkbox"/> Emergent plants &gt; 40 inches (&gt;100cm) high are the highest layer with &gt; 30% cover  <input type="checkbox"/> Scrub/shrub (areas where shrubs have &gt; 30% cover)  <input checked="" type="checkbox"/> Forested (areas where trees have &gt; 30% cover)</p> <p><i>Add the number of vegetation types that qualify. If you have:</i>            4 – 6 types ..... points = 3 <input type="checkbox"/>                      2 types ..... points = 1 <input checked="" type="checkbox"/>            3 types ..... points = 2 <input type="checkbox"/>                              1 type ..... points = 0 <input checked="" type="checkbox"/></p> <p style="text-align: center;"><b>Map of Cowardin vegetation classes and areas with different heights of emergents</b></p>	<p><b>Figure</b> <input type="checkbox"/></p> <p style="text-align: right;">1</p>
	<p>H 1.2 Is one of the vegetation types “aquatic bed?” (see p.64)  <input type="checkbox"/> <b>YES</b> = 1 point                      <input checked="" type="checkbox"/> <b>NO</b> = 0 points</p>	<p>0</p>
	<p>H 1.3 <b>Surface Water (see p. 65)</b>            H1.3.1 Does the unit have areas of “open” water (without emergent or shrub plants) over at least 1/4 acre or 10% of its area during the spring (March – early June) OR in early fall (August – end of September)? <i>Note: answer YES for Lake-fringe wetlands.</i>  <input type="checkbox"/> YES = 3 points &amp; <b>go to H 1.4</b>                      <input checked="" type="checkbox"/> NO = go to H 1.3.2            H 1.3.2 Does the unit have an intermittent or permanent stream within its boundaries, or along one side, over at least 1/4 acre or 10% of its area, AND that has an unvegetated bottom (answer yes only if H 1.3.1 is NO)?  <input type="checkbox"/> YES = 3 points    <input checked="" type="checkbox"/> NO = 0 points</p> <p style="text-align: right;"><b>Map showing areas of open water</b></p>	<p><b>Figure</b> <input type="checkbox"/></p> <p>0</p>
	<p>H 1.4 <b>Richness of Plant Species (see p. 66)</b>            Count the number of plant species in the wetland that cover at least 10 ft<sup>2</sup> (<i>different patches of the same species can be combined to meet the size threshold</i>)  <i>You do not have to name the species. Do not include Eurasian Milfoil, reed canarygrass, purple loosestrife, Russian Olive, Phragmites, Canadian Thistle, Yellow-flag Iris, and Salt Cedar (Tamarisk)</i>            If you counted:                                             &gt; 9 species                      points = 2 <input type="checkbox"/>                                             4 – 9 species                      points = 1 <input checked="" type="checkbox"/>                                             &lt; 4 species                      points = 0 <input type="checkbox"/></p> <p><i>List species below if you wish: _____</i>                      # of species <u>4</u></p>	<p>1</p>
	<p>H 1.5 <b>Interspersion of Habitats (see p. 67)</b>            Decided from the diagrams below whether interspersion between types of vegetation (described in H1.1), or categories and unvegetated areas (can include open water or mudflats) is high, medium, low, or none.</p> <div style="text-align: center;"> <p>None = 0 points      Low = 1 point      Moderate = 2 points</p> <p>High = 3 points      [riparian braided channels]</p> </div> <p>Note: If you have 4 or more vegetation categories or 3 vegetation categories and open water, the rating is always “high”.  <b>Use maps from H 1.1 and H 1.3</b></p>	<p><b>Figure</b> <input type="checkbox"/></p> <p>1</p>

Comments: \_\_\_\_\_

Wetland name or number: \_\_\_\_\_

	<p>H 1.6 <b>Special Habitat Features</b> (see p. 68)  <i>Check the habitat features that are present in the wetland unit. The number of checks is the number of points you put into the next column.</i></p> <p><input checked="" type="checkbox"/> Loose rocks larger than 4" <b>or</b> large, downed, woody debris (&gt; 4 in. diameter) within the area of surface ponding or in stream</p> <p><input type="checkbox"/> Cattails or bulrushes are present within the unit</p> <p><input type="checkbox"/> Standing snags (diameter at the bottom &gt; 4 inches) in the wetland unit or within 30m (100 ft) of the edge</p> <p><input type="checkbox"/> Emergent or shrub vegetation in areas that are permanently inundated/ponded. <i>The presence of "yellow flag" Iris is a good indicator of vegetation in areas permanently ponded.</i></p> <p><input type="checkbox"/> Stable steep banks of fine material that might be used by beaver or muskrat for denning (&gt; 45 degree slope) <b>OR</b> signs of recent beaver activity</p> <p><input type="checkbox"/> Invasive species cover less than 20% in each stratum of vegetation (<i>canopy, sub-canopy, shrubs, herbaceous, moss/ground cover</i>)</p> <p style="text-align: right;">Maximum score possible = 6</p>	1	
<p><b>H 1 TOTAL Score</b> – potential to provide habitat <span style="float: right;"><i>Add the scores in the column above</i></span></p>		<table border="1"> <tr> <td style="text-align: center;"><b>4</b></td> </tr> </table>	<b>4</b>
<b>4</b>			
<p><b>H 2 Does the wetland have the opportunity to provide habitat for many species?</b></p>		<p>(only 1 score per box)</p>	
	<p>H 2.1 <b>Buffers</b> (see P. 71):  <i>Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed". Relatively undisturbed also means no grazing, no landscaping, no daily human use, and no structures or paving within undisturbed part of buffer.</i></p> <p><input type="checkbox"/> 330 ft (100m) of relatively undisturbed vegetated areas, rocky areas, or open water &gt; 95% of circumference..... <b>points = 5</b></p> <p><input type="checkbox"/> 330 ft (100m) of relatively undisturbed vegetated areas, rocky areas, or open water &gt; 50% circumference..... <b>points = 4</b></p> <p><input type="checkbox"/> 170 ft (50m) of relatively undisturbed vegetated areas, rocky areas, or open water &gt; 95% circumference..... <b>points = 4</b></p> <p><input type="checkbox"/> 330 ft (100m) of relatively undisturbed vegetated areas, rocky areas, or open water &gt; 25% circumference..... <b>points = 3</b></p> <p><input type="checkbox"/> 170 ft (50m) of relatively undisturbed vegetated areas, rocky areas, or open water for &gt; 50% circumference..... <b>points = 3</b></p> <p><b>If buffer does not meet any of the three criteria above:</b></p> <p><input type="checkbox"/> No paved areas (except paved trails) or buildings within 80 ft (25m) of wetland &gt; 95% circumference. Light to moderate grazing or lawns are OK..... <b>points = 2</b></p> <p><input type="checkbox"/> No paved areas of buildings within 170 ft (50m) of wetland for &gt; 50% circumference. Light to moderate grazing or lawns are OK..... <b>points = 2</b></p> <p><input type="checkbox"/> Heavy grazing in buffer..... <b>points = 1</b></p> <p><input checked="" type="checkbox"/> Vegetated buffers are &lt; 6.6 ft wide (2m) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland)..... <b>points = 0</b></p> <p><input type="checkbox"/> Buffer does not meet any of the criteria above..... <b>points = 1</b></p>	<p><b>Figure</b> <input type="checkbox"/></p> <p style="text-align: center;">1</p>	
	<p>H 2.2 <b>Wet Corridors</b> (see p. 72)</p> <p>H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken, &gt; 30 ft. wide, vegetated corridor at least 1/4 mile long with surface water or water flowing water throughout most of the year (&gt; 9 months/yr?) (dams, heavily used gravel roads, paved roads, fields tilled to edge of stream, or pasture to edge of stream are considered breaks in the corridor).</p> <p style="padding-left: 40px;"><input type="checkbox"/> <b>YES = 4 points</b> (go to H 2.3)                      <input type="checkbox"/> <b>NO</b> = go to H 2.2.2</p> <p>H. 2.2.2 Is the unit part of a relatively undisturbed and unbroken, &gt; 30 ft. wide, vegetated corridor, at least 1/4 mile long with water flowing seasonally, <b>OR</b> a lake-fringe wetland without a "wet" corridor, <b>OR</b> a riverine wetland without a surface channel connecting to the stream?</p> <p style="padding-left: 40px;"><input checked="" type="checkbox"/> <b>YES = 2 points</b> (go to H 2.3)                      <input type="checkbox"/> <b>NO</b> = go to H 2.2.3</p> <p>H. 2.2.3 Is the wetland within 1/2 mile of any permanent stream, seasonal stream, or lake (<i>do not include man-made ditches</i>)?</p> <p style="padding-left: 40px;"><input type="checkbox"/> <b>YES</b> = 1 point    <input type="checkbox"/> <b>NO</b> = 0 points</p>	2	

Comments: \_\_\_\_\_

Wetland name or number: \_\_\_\_\_

	<p>H 2.3 Near or adjacent to other priority habitats listed by WDFW (<i>see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report <a href="http://wdfw.wa.gov/hab/phslist.htm">http://wdfw.wa.gov/hab/phslist.htm</a></i>). Which of the following priority habitats are within 330ft (100m) of the wetland unit?  <i>NOTE: the connections to the habitats can be disturbed.</i></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>Aspen Stands:</b> Pure or mixed stands of aspen greater than 0.4 ha (1 acre).</li> <li><input type="checkbox"/> <b>Biodiversity Areas and Corridors:</b> Areas of habitat that are relatively important to various species of native fish and wildlife (may include urban or urban growth areas) (<i>full descriptions in WDFW PHS report p. 152</i>).</li> <li><input type="checkbox"/> <b>Eastside Steppe:</b> Non-forested vegetation type dominated by broadleaf herbaceous flora(i.e., forbs), perennial bunchgrasses, or a combination of both (<i>full description of species found here in WDFW PHS report p. 153</i>).</li> <li><input type="checkbox"/> <b>Old-growth/Mature forests (east of Cascade crest):</b> (<i>full descriptions in WDFW PHS report p. 157</i>). Old-growth: Stands are &gt; 150 yrs in age; may be variable in tree species composition and structural characteristics due to the influence of fire, climate, and soils. Mature: Stands 80 – 160 yrs old. Decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth.</li> <li><input type="checkbox"/> <b>Oregon white Oak:</b> Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (<i>full descriptions in WDFW PHS report p. 158</i>).</li> <li><input type="checkbox"/> <b>Juniper Savannah:</b> All juniper woodlands (<i>SE part of state only; check map</i>)</li> <li><input type="checkbox"/> <b>Shrub-steppe:</b> A nonforested vegetation type consisting of one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of shrubs (see Eastside Steppe for sites with little or no shrub cover).</li> <li><input checked="" type="checkbox"/> <b>Riparian:</b> The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.</li> <li><input type="checkbox"/> <b>Inland Dunes</b> This placeholder is for a new priority habitat that will capture areas known as Inland Dunes. A definition will be developed later in Fall 2008. (<i>check WDFW web site</i>)</li> <li><input checked="" type="checkbox"/> <b>Instream:</b> The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.</li> <li><input type="checkbox"/> <b>Caves:</b> A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.</li> <li><input type="checkbox"/> <b>Cliffs:</b> Greater than 7.6 m (25 ft) high and occurring below 5000 ft.</li> <li><input type="checkbox"/> <b>Talus:</b> Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.</li> <li><input type="checkbox"/> <b>Snags and Logs:</b> Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of &gt; 30 cm (12 in) in eastern Washington and are &gt; 2 m (6.5 ft) in height. Priority logs are &gt; 30 cm (12 in) in diameter at the largest end, and &gt; 6 m (20 ft) long.</li> </ul> <p style="text-align: right;">If wetland has <b>2 or more</b> Priority Habitats = <b>4 points</b>          If wetland has <b>1</b> Priority Habitat = <b>2 points</b>          No Priority habitats = <b>0 points</b></p> <p><i>Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in H 2.4)</i></p>	4
	<p>H 2.4 <u>Landscape:</u> Choose the <b>one</b> description of the landscape around the wetland that best fits. (<i>see p. 76</i>)</p> <ul style="list-style-type: none"> <li>• The wetland unit is in an area where annual rainfall is less than 12 inches, and its water regime is not influenced by irrigation practices, dams, or water control structures. (<i>Generally, this means outside boundaries of reclamation areas, irrigation district, or reservoirs.</i>)..... points = 5 <input type="checkbox"/></li> <li>• There are at least 3 other wetlands within 1/2 mile, and the connections between them are relatively undisturbed (light grazing in the connection or an open water connection along a lake shore without heavy boat traffic are OK, but connections should NOT be bisected by paved roads, fill, fields, heavy boat traffic or other development..... points = 5 <input type="checkbox"/></li> <li>• There are at least 3 other wetlands within 1/2 mile, BUT the connections between them are disturbed. .... points = 2 <input checked="" type="checkbox"/></li> <li>• There is at least 1 wetland within 1/2 mile ..... points = 1 <input type="checkbox"/></li> <li>• Does not meet any of the four criteria above ..... points = 0 <input type="checkbox"/></li> </ul>	2
	<p><b>H 2 TOTAL Score – opportunity for providing habitat</b> <span style="float: right;"><i>Add the scores in the columns above</i></span></p>	9
<b>H 3</b>	<b>Does the wetland unit have indicators that its ability to provide habitat is reduced?</b>	
	<p>H 3.1 <u>Indicator of reduced habitat functions</u> (<i>see p. 75</i>)          Do the areas of open water in the wetland unit have a resident population of carp (see text for indicators of the presence of carp)? Note: <i>This question does not apply to reservoirs with water levels controlled by dams, such as the reservoirs on the Columbia and Snake Rivers.</i></p> <p style="text-align: center;"><input type="checkbox"/> <b>YES = 5 points</b> <span style="margin-left: 200px;"><input checked="" type="checkbox"/> <b>NO = 0 points</b></span></p>	<p><i>Points will be subtracted</i></p> <p style="text-align: center;">0</p>
<b>◆</b>	<p><b>Total Score for Habitat Functions</b> <span style="float: right;"><i>Add the points for H 1, H 2 and H 3; and record the result on p. 1</i></span></p>	<b>13</b>

Comments: \_\_\_\_\_

Wetland name or number: \_\_\_\_\_

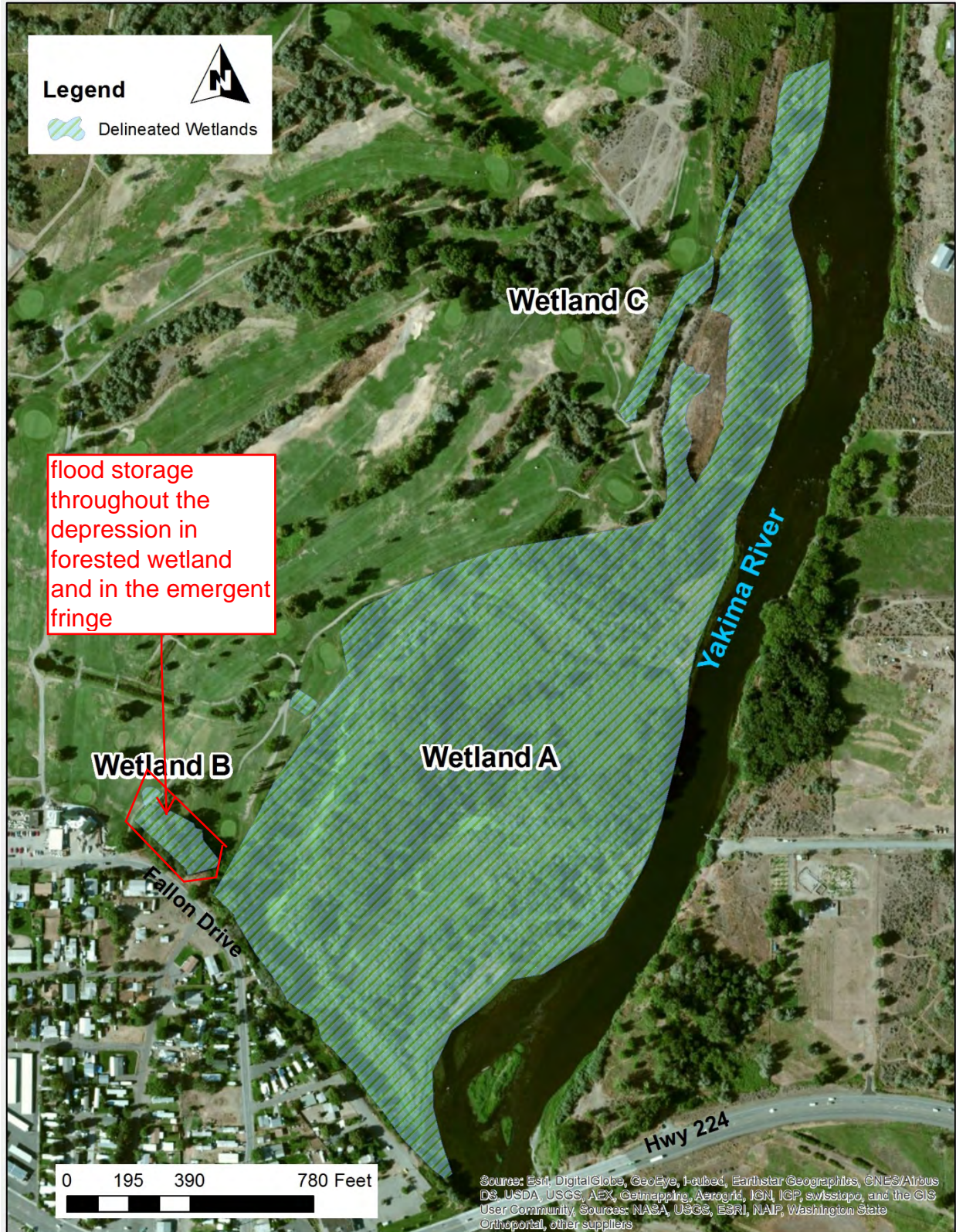
### CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

*Please determine if the wetland meets the attributes described below and circle the appropriate Category. NOTE: A wetland may meet the criteria for more than one set of special characteristics. Record all those that apply. NOTE: All units should also be characterized based on their functions.*

<b>Wetland Type</b> – Check off any criteria that apply to the wetland. Circle the Category when the appropriate criteria are met.	
<b>SC1</b>	<p><b>Vernal pools</b> (see p.79)</p> <p>Is the wetland unit <b>less than 4,000 ft<sup>2</sup></b>, and does it meet at least <b>two</b> of the following criteria?</p> <p><input type="checkbox"/> Its only source of water is rainfall or snowmelt from a small contributing basin and has no groundwater input.</p> <p><input type="checkbox"/> Wetland plants are typically present only in the spring; the summer vegetation is typically upland annuals. <i>NOTE: If you find perennial, “obligate”, wetland plants the wetland is probably NOT a vernal pool.</i></p> <p><input type="checkbox"/> The soil in the wetland are shallow (&lt;1 ft. deep (30cm) and is underlain by an impermeable layer such as basalt or clay.</p> <p><input type="checkbox"/> Surface water is present for less than 120 days during the “wet” season.</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> = Go to SC 1.1                      <input checked="" type="checkbox"/> <b>NO</b> not a vernal pool</p>
	<p>SC 1.1 Is the vernal pool relatively undisturbed in February and March?</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> = Go to SC 1.2                      <input type="checkbox"/> <b>NO</b> = not a vernal pool with special characteristics</p>
	<p>SC 1.2 Is the vernal pool in an area where there are at least 3 separate aquatic resources within 0.5 miles (other wetlands, rivers, lakes etc.)?</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> = Category II                      <input type="checkbox"/> <b>NO</b> = Category III</p>
	<p><input type="checkbox"/> <b>Cat. II</b> <input type="checkbox"/> <b>Cat. III</b></p>
<b>SC2</b>	<p><b>Alkali wetlands</b> (see p.81)</p> <p>Does the wetland unit meet <b>one</b> of the following two criteria?</p> <p><input type="checkbox"/> The wetland has a conductivity &gt; 3.0 mS/cm.</p> <p><input type="checkbox"/> The wetland has a conductivity between 2.0 – 3.0 mS, and more than 50% of the plant cover in the wetland can be classified as “alkali” species (see Table 2 for list of plants found in alkali systems).</p> <p><input type="checkbox"/> If the wetland is dry at the time of your field visit, the central part of the area is covered with a layer of salt.</p> <p><b>OR</b> does the wetland meet <b>two</b> of the following three sub-criteria?</p> <p><input type="checkbox"/> Salt encrustations around more than 80% of the edge of the wetland.</p> <p><input type="checkbox"/> More than 3/4 of the plant cover consists of species listed on Table 2.</p> <p><input type="checkbox"/> A pH above 9.0. All alkali wetlands have a high pH, but please note that some freshwater wetlands may also have a high pH. Thus, pH alone is not a good indicator of alkali wetlands.</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> = Category I                      <input checked="" type="checkbox"/> <b>NO</b> – not an alkali wetland</p>
	<p><b>Cat. I</b> <input type="checkbox"/></p>
<b>SC3</b>	<p><b>Natural Heritage Wetlands</b> (see p. 82)</p> <p>Natural Heritage wetlands have been identified by the Washington Natural Heritage Program/DNR as either high quality undisturbed wetlands or wetlands that support state Threatened, Endangered, or Sensitive plant species.</p> <p>SC 3.1 Is the wetland unit being rated in a Section/Township/Range that contains a natural heritage wetland? (This question is used to screen out most sites before you need to contact WNHP/DNR.)</p> <p>S/T/R information from Appendix D <input type="checkbox"/> or accessed from WNHP/DNR web site <input type="checkbox"/></p> <p style="text-align: center;"><b>YES</b> <input type="checkbox"/> Contact WNHP/DNR (see p. 79) and go to SC 3.2                      <b>NO</b> <input type="checkbox"/></p> <p>SC 3.2 Has DNR identified the wetland unit as a high quality undisturbed wetland or as a site with state threatened or endangered plant species?</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> = Category I                      <input checked="" type="checkbox"/> <b>NO</b> – not a natural heritage wetland</p>
	<p><b>Cat. I</b> <input type="checkbox"/></p>

Figure 1

Wetland Assessment Unit Wetland B



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Wetland name or number: \_\_\_\_\_

<p><b>SC4</b></p>	<p><b>Bogs</b> (see p. 82)          Does the wetland unit (<b>or any part of the wetland unit</b>) meet both the criteria for soils and vegetation in bogs? Use the key below to identify if the wetland is a bog. <i>If you answer yes you will still need to rate the wetland based on its functions.</i></p> <p>SC 4.1 Does the wetland have organic soil horizons (i.e. layers of organic soil), either peats or mucks, that compose 16 inches or more of the first 32 inches of the soil profile? (See Appendix B for a field key to identify organic soils.)  <input type="checkbox"/> <b>YES</b> = go to SC 4.3      <input checked="" type="checkbox"/> <b>NO</b> = go to SC 4.2</p> <p>SC 4.2 Does the wetland have organic soils, either peats or mucks that are less than 16 inches deep over bedrock or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond?  <input type="checkbox"/> <b>YES</b> = go to 4.3      <input checked="" type="checkbox"/> <b>NO</b> = Is not a bog for rating</p> <p>SC 4.3 Does the wetland have more than 70% cover of mosses at ground level in any area within its boundaries, AND other plants, if present, consist of the “bog” species listed in Table 3 as a significant component of the vegetation (more than 30% of the total shrub and herbaceous cover consists of species in Table 3)?  <input type="checkbox"/> <b>YES</b> = Category I bog      <input checked="" type="checkbox"/> <b>NO</b> = go to question 4.4</p> <p>NOTE: <i>If you are uncertain about the extent of mosses in the understory you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16” deep. If the pH is less than 5.0 and the “bog” plant species in Table 3 are present, the wetland is a bog.</i></p> <p>SC 4.4 Is the unit, or any part of it, forested (&gt; 30% cover) with sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Englemann’s spruce, or western white pine, WITH any of the species (or combination of species) on the bog species plant list in Table 3 as a significant component of the ground cover (&gt; 30% coverage of the total shrub/herbaceous cover)?  <input type="checkbox"/> <b>YES</b> = Category 1 bog      <input checked="" type="checkbox"/> <b>NO</b></p>	<p><b>Cat. I</b>  <input type="checkbox"/></p>
<p><b>SC5</b></p>	<p><b>Forested Wetlands</b> (see p. 85)          Does the wetland unit have an area of forest (<i>you should have identified a forested class, if present, in question H 1.1</i>) rooted within its boundary that meet <b>at least one</b> of the following three criteria?  <input checked="" type="checkbox"/> The wetland is within the “100 year” floodplain of a river or stream.  <input type="checkbox"/> Aspen (<i>Populus tremuloides</i>) are a dominant or co-dominant of the “woody” vegetation. (<i>Dominant means it represents at least 50% of the cover of woody species, co-dominant means it represents at least 20% of the total cover of woody species.</i>)  <input type="checkbox"/> There is at least 1/4 acre of trees (even in wetlands smaller than 2.5 acres) that are “mature” or “old-growth” according to the definitions for these priority habitats developed by WDFW (see p. 83).  <input checked="" type="checkbox"/> <b>YES</b> = go to SC 5.1      <input type="checkbox"/> <b>NO</b> – not a forested wetland with special characteristics</p>	<p style="background-color: #cccccc;"></p>
	<p>SC 5.1 Does the wetland unit have a forest canopy where more than 50% of the tree species (by cover) are slow growing native trees? Slow growing trees are: western red cedar (<i>Thuja plicata</i>), Alaska yellow cedar (<i>Chamaecyparis nootkatensis</i>), pine spp. mostly “white” pine (<i>Pinus monticola</i>), western hemlock (<i>Tsuga heterophylla</i>), Englemann spruce (<i>Picea engelmannii</i>)?  <input type="checkbox"/> <b>YES</b> = Category I      <input checked="" type="checkbox"/> <b>NO</b> = go to SC 5.2</p>	<p><b>Cat. I</b>  <input type="checkbox"/></p>
	<p>SC 5.2 Does the unit have areas where aspen (<i>Populus tremuloides</i>) as a dominant or co-dominant species?  <input type="checkbox"/> <b>YES</b> = Category I      <input checked="" type="checkbox"/> <b>NO</b> = go to SC 5.3</p>	<p><b>Cat. I</b>  <input type="checkbox"/></p>
	<p>SC 5.3 Does the wetland unit have a forest canopy where more than 50% of the tree species (by cover) are fast growing species? Fast growing species are: Alders – red (<i>alnus rubra</i>), thin-leaf (<i>A. tenuifolia</i>); Cottonwoods – narrow-leaf (<i>Populus angustifolia</i>), black (<i>P. balsamifera</i>); Willows – peach-leaf (<i>Salix amygdaloides</i>), Sitka (<i>S. sitchensis</i>), Pacific (<i>S. lasiandra</i>), Aspen – <i>Populus tremuloides</i>, Water Birch (<i>Betula occidentalis</i>)  <input type="checkbox"/> <b>YES</b> = Category II      <input checked="" type="checkbox"/> <b>NO</b> = go to SC 5.5</p>	<p><b>Cat. II</b>  <input type="checkbox"/></p>
	<p>SC 5.5 Is the forested component of the wetland within the “100 year floodplain” of a river or stream?  <input checked="" type="checkbox"/> <b>YES</b> = Category II</p>	<p><b>Cat. II</b>  <input checked="" type="checkbox"/></p>
<p>◆</p>	<p><b>Category of wetland based on Special Characteristics</b>  <i>Choose the “highest” rating if wetland falls into several categories.</i>          If you answered <b>NO</b> for all types enter “Not Applicable” on p. 1</p>	<p><b>II</b></p>

Wetland name or number: \_\_\_\_\_

**WETLAND RATING FORM – EASTERN WASHINGTON**

Version 2 – Updated July 2006 to increase accuracy and reproducibility among users –  
Updated Oct. 2008 with the new WDFW definitions for priority habitats

Name of wetland (if known): C

Date of site visit: 11/7/14

Rated by: M. Anderson

Trained by Ecology?  Yes  No

Date of training: 09/2011

SEC: 32

TWNSHP: 10N

RNGE: 28E

Is S/T/R in Appendix D?  Yes  No

Map of wetland unit: Figure 1

Estimated size 49

**SUMMARY OF RATING**

Category based on FUNCTIONS provided by wetland:  I  II  III  IV

Category I =	Score > 70
Category II =	Score 51 - 69
Category III =	Score 30 - 50
Category IV =	Score < 30

Score for "Water Quality" Functions

**16**

Score for Hydrologic Functions

**12**

Score for Habitat Functions

**13**

TOTAL score for Functions

**41**

Category based on SPECIAL CHARACTERISTICS of Wetland:  I  II  III  Does not Apply

**Final Category** (choose the "highest" category from above)

**II**

**Summary of basic information about the wetland unit.**

Wetland Type		Wetland Class	
Vernal Pool	<input type="checkbox"/>	Depressional	<input checked="" type="checkbox"/>
Alkali	<input type="checkbox"/>	Riverine	<input type="checkbox"/>
Natural Heritage Wetland	<input type="checkbox"/>	Lake-fringe	<input type="checkbox"/>
Bog	<input type="checkbox"/>	Slope	<input type="checkbox"/>
Forest	<input checked="" type="checkbox"/>	Check if unit has multiple HGM classes present	<input type="checkbox"/>
None of the above	<input type="checkbox"/>		

**Does the wetland being rated meet any of the criteria below?**

If you answer YES to any of the questions below you will need to protect the wetland according to the regulations regarding the special characteristics found in the wetland.

Check List for Wetlands that Need Special and that are Not Included in the Rating	YES	NO
SP1. <i>Has the wetland unit been documented as a habitat for any Federally listed Threatened or Endangered animal or plant species (T/E species)?</i> For the purposes of this rating system, "documented" means the wetland is on the appropriate state or federal database.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SP2. <i>Has the wetland unit been documented as habitat for any State listed Threatened or Endangered animal species?</i> For the purposes of this rating system, "documented" means the wetland is on the appropriate state database. Note: Wetlands with State listed plant species are categorized as Category 1 Natural Heritage Wetlands (see p. 19 of data form).	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SP3. <i>Does the wetland unit contain individuals of Priority species listed by the WDFW for the state?</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
SP4. <i>Does the wetland unit have a local significance in addition to its functions?</i> For example, the wetland has been identified in the Shoreline Master Program, the Critical Areas Ordinance, or in a local management plan as having special significance.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

**To complete the next part of the data sheet you will need to determine the Hydrogeomorphic Class of the wetland being rated.**

The hydrogeomorphic classification groups wetlands into those that function in similar ways. Classifying the wetland first simplifies the questions needed to answer how it functions. The Hydrogeomorphic Class of a wetland can be determined using the key below. See p. 20 for more detailed instructions on classifying wetlands.



Wetland name or number: \_\_\_\_\_

### Classification of Vegetated Wetlands for Eastern Washington

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Does the entire wetland unit **meet both** of the following criteria?

- The vegetated part of the wetland is on the shores of a body of open water (without any vegetation on the surface) where at least 20 acres (8 ha) in size;
- At least 30% of the open water area is deeper than 3 m (10 ft)?

NO – go to Step 2       YES – The wetland class is **Lake-fringe (lacustrine fringe)**

2. Does the wetland unit **meet all** of the following criteria?

- The wetland is on a slope (*slope can be very gradual*).
  - The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.
  - The water leaves the wetland **without being impounded**?
- NOTE: *Surface water does not pond in these types of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than a foot deep).*

NO – go to Step 3       YES – The wetland class is **Slope**

3. Is the wetland unit in a valley or stream channel where it gets inundated by overbank flooding from that stream or river? In general, the flooding should occur at least once every ten years to answer “yes”. *The wetland can contain depressions that are filled with water when the river is not flooding.*

NO – go to Step 4       YES – The wetland class is **Riverine**

4. Is the wetland unit in a topographic depression, outside areas that are inundated by overbank flooding, in which water ponds, or is saturated to the surface, at some time of the year. *This means that any outlet, if present is higher than the interior of the wetland.*

NO – go to Step 5       YES – The wetland class is **Depressional**

5. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a depressional wetland has a zone of flooding along its sides. **GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT** (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within your wetland. NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the class listed in column 2 is less than 10% of the unit, classify the wetland using the class that represents more than 90% of the total area.

<i>HGM Classes Within One Delineated Wetland Boundary</i>	<i>Class to Use for Rating</i>
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake-fringe	Lake-fringe
Depressional + Riverine (riverine is within boundary of depression)	Depressional
Depressional + Lake-fringe	Depressional

If you are unable still to determine which of the above criteria apply to your wetland, or you have more than 2 HGM classes within a wetland boundary, classify the wetland as **Depressional** for the rating.

Wetland name or number: \_\_\_\_\_

D Depressional and Flat Wetlands			Points (only 1 score per box)
WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.			
<b>D 1</b>	<b>Does the wetland unit have the potential to improve water quality?</b>		(see p.38)
D 1.1	Characteristics of surface water flows out of the wetland unit: <ul style="list-style-type: none"> <li>• Wetland has no surface water outlet..... points = 5 <input type="checkbox"/></li> <li>• Wetland has an intermittently flowing outlet..... points = 3 <input type="checkbox"/></li> <li>• Wetland has a highly constricted permanently flowing outlet..... points = 3 <input checked="" type="checkbox"/></li> <li>• Wetland has a permanently flowing surface outlet ..... points = 1 <input type="checkbox"/></li> </ul>	<b>3</b>	
D 1.2	The soil 2 inches below the surface (or duff layer) is clay or organic ( <i>use NRCS definition of soil types</i> ). <input type="checkbox"/> <b>YES</b> points = 3 <input checked="" type="checkbox"/> <b>NO</b> points = 0	<b>0</b>	
D 1.3	Characteristics of persistent vegetation (emergent, shrub, and/or forest Cowardin class): <ul style="list-style-type: none"> <li>• Wetland has persistent, ungrazed vegetation for &gt; = 2/3 of area..... points = 5 <input checked="" type="checkbox"/></li> <li>• Wetland has persistent, ungrazed vegetation from 1/3 to 2/3 of area ..... points = 3 <input type="checkbox"/></li> <li>• Wetland has persistent, ungrazed vegetation from 1/10 to &lt; 1/3 of area ..... points = 1 <input type="checkbox"/></li> <li>• Wetland has persistent, ungrazed vegetation &lt; 1/10 of area..... points = 0 <input type="checkbox"/></li> </ul> <b>Map of Cowardin vegetation classes</b>	<b>Figure <u>11</u></b>	<b>5</b>
D 1.4	Characteristics of seasonal ponding or inundation: <i>This is the area of ponding that fluctuates every year. Do not count the area that is permanently ponded.</i> <ul style="list-style-type: none"> <li>• Area seasonally ponded is &gt; 1/2 total area of wetland ..... points = 3 <input type="checkbox"/></li> <li>• Area seasonally ponded is 1/4 to 1/2 total area of wetland ..... points = 1 <input type="checkbox"/></li> <li>• Area seasonally ponded is &lt; 1/4 total area of wetland ..... points = 0 <input checked="" type="checkbox"/></li> </ul> <b>NOTE: See text for indicators of seasonal and permanent inundation/flooding..... Map of Hydroperiods</b>	<b>Figure <u>   </u></b>	<b>0</b>
<b>Total for D 1</b>		<i>Add the points in the boxes above</i>	<b>8</b>
<b>D 2</b>	<b>Does the wetland unit have the opportunity to improve water quality?</b> Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? <i>Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.</i> <input type="checkbox"/> Grazing in the wetland or within 150 ft <input type="checkbox"/> Untreated stormwater discharges to wetland <input type="checkbox"/> Tilled fields or orchards within 150 ft. of wetland <input type="checkbox"/> A stream or culvert discharges into wetland that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging <input checked="" type="checkbox"/> Residential, urban areas, golf courses are within 150 ft. of wetland <input type="checkbox"/> Wetland is fed by groundwater high in phosphorus or nitrogen <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> <b>YES</b> multiplier is 2 <input type="checkbox"/> <b>NO</b> multiplier is 1	Multiplier	<b>2</b>
<b>◆</b>	<b>TOTAL – Water Quality Functions</b> Multiply the score from D1 by D2. <b>Record score on p. 1 of field form</b>		<b>16</b>
<b>HYDROLOGIC FUNCTIONS – Indicators that wetland functions to reduce flooding and stream erosion.</b>			
<b>D 3</b>	<b>Does the wetland unit have the potential to reduce flooding and stream erosion?</b>		(see p.39)
D 3.1	Characteristics of surface water flows out of the wetland unit: <ul style="list-style-type: none"> <li>• Wetland has no surface water outlet..... points = 8 <input type="checkbox"/></li> <li>• Wetland has an intermittently flowing outlet..... points = 4 <input checked="" type="checkbox"/></li> <li>• Wetland has a highly constricted permanently flowing outlet..... points = 4 <input type="checkbox"/></li> <li>• Wetland has a permanently flowing surface outlet ..... points = 0 <input type="checkbox"/></li> </ul>	<b>4</b>	
D 3.2	Depth of storage during wet periods. <i>Estimate the height of ponding above the surface of the wetland (see text for description of measuring height). In wetlands with permanent ponding, the surface is the lowest elevation of “permanent” water.</i> <ul style="list-style-type: none"> <li>• Marks of ponding are at least 3 ft. above the surface..... points = 8 <input type="checkbox"/></li> <li>• The wetland is a “headwater” wetland (<i>see p. 39</i>) ..... points = 6 <input type="checkbox"/></li> <li>• Marks are 2 ft. to &lt; 3 ft. from surface ..... points = 6 <input type="checkbox"/></li> <li>• Marks are 1 ft. to &lt; 2 ft. from surface ..... points = 4 <input type="checkbox"/></li> <li>• Marks are 6 in. to &lt; 1 ft. from surface..... points = 2 <input checked="" type="checkbox"/></li> <li>• No marks above 6 in. or wetland has only saturated soils..... points = 0 <input type="checkbox"/></li> </ul>	<b>2</b>	
<b>Total for D 3</b>		<i>Add the points in the boxes above</i>	<b>6</b>
<b>D 4</b>	<b>Does the wetland unit have the opportunity to reduce flooding and erosion?</b> <i>Answer NO if the major source of water is groundwater, irrigation return flow, or water levels in the wetland are controlled by a reservoir. Answer YES if the wetland is in a location in the watershed where the flood storage, or reduction in water velocity it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. Note which of the following conditions apply.</i> <input type="checkbox"/> Wetland is in a headwater of a river or stream that has flooding problems. <input checked="" type="checkbox"/> Wetland drains to a river or stream that has flooding problems <input type="checkbox"/> Wetland has no outlet and impounds surface runoff water that might otherwise flow into a river or stream that has flooding problems <input type="checkbox"/> Other _____ <input checked="" type="checkbox"/> <b>YES</b> multiplier is 2 <input type="checkbox"/> <b>NO</b> multiplier is 1	Multiplier	<b>2</b>
<b>◆</b>	<b>TOTAL – Hydrologic Functions</b> Multiply the score from D3 by D4; then <b>record score on p.1 of field form.</b>		<b>12</b>

Wetland name or number: \_\_\_\_\_

<b>R Riverine Wetlands</b>		<b>Points</b>
WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.		(only 1 score per box)
<b>R 1</b>	<b>Does the wetland unit have the potential to improve water quality?</b>	(see p.45)
	R 1.1 Area of surface depressions within the riverine wetland that can trap sediments during a flooding event: <ul style="list-style-type: none"> <li>• Depressions cover &gt; 1/3 area of wetland ..... points = 6 <input type="checkbox"/></li> <li>• Depressions cover &gt; 1/10 area of wetland ..... points = 3 <input type="checkbox"/></li> <li style="padding-left: 20px;"><b>If depressions &gt; 1/10<sup>th</sup> of area of unit draw polygons on aerial photo or map.</b></li> <li>• Depressions present but cover &lt; 1/10 area of wetland ..... points = 1 <input type="checkbox"/></li> <li>• No depressions present ..... points = 0 <input type="checkbox"/></li> </ul>	Figure <input type="checkbox"/>
	R 1.2 Characteristics (cover) of the vegetation in the unit ( <i>area of polygons with &gt; 90% cover at person height. This is not Cowardin vegetation classes</i> ): <ul style="list-style-type: none"> <li>• Forest or shrub &gt; 2/3 the area of the wetland..... points =10 <input type="checkbox"/></li> <li>• Forest or shrub 1/3 – 2/3 area of the wetland..... points = 5 <input type="checkbox"/></li> <li>• Ungrazed, herbaceous plants &gt; 2/3 area of wetland ..... points = 5 <input type="checkbox"/></li> <li>• Ungrazed herbaceous plants 1/3 – 2/3 area of wetland ..... points = 2 <input type="checkbox"/></li> <li>• Forest, shrub, and ungrazed herbaceous &lt; 1/3 area of wetland ..... points = 0 <input type="checkbox"/></li> </ul> <p style="text-align: center;"><b>Aerial photo or map showing polygons of different vegetation cover</b></p>	Figure <input type="checkbox"/>
Total for R1		Add the points in the boxes above
<b>R 2</b>	<b>Does the wetland have the opportunity to improve water quality?</b>	(see p. 46)
	Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland. <i>Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.</i> <ul style="list-style-type: none"> <li><input type="checkbox"/> Grazing in the wetland or within 150 ft               <ul style="list-style-type: none"> <li><input type="checkbox"/> Wetland intercepts groundwater within the Reclamation Area</li> <li><input type="checkbox"/> Untreated stormwater flows into wetland</li> <li><input type="checkbox"/> Tilled fields or orchards within 150 ft. of wetland</li> <li><input type="checkbox"/> Water flows into wetland from a stream or culvert that drains developed areas, residential areas, farmed fields, roads, or clear-cut logging</li> <li><input type="checkbox"/> Residential or urban areas are within 150 ft. of wetland</li> <li><input type="checkbox"/> The river or stream that floods the wetland has a contributing basin where human activities have raised levels of sediment, toxic compounds or nutrients in the river water above water quality standards.</li> </ul> </li> <li><input type="checkbox"/> Other _____</li> </ul> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> multiplier is 2      <input type="checkbox"/> <b>NO</b> multiplier is 1</p>	Multiplier
<b>◆ TOTAL – Water Quality Functions</b> Multiply the score from R1 by the multiplier in R2; then <b>record score on p.1 of field form.</b>		_____
HYDROLOGIC FUNCTIONS – Indicators that wetland functions to reduce flooding and stream degradation.		
<b>R 3</b>	<b>Does the wetland have the potential to reduce flooding and erosion?</b>	(see p.47)
	R 3.1 Amount overbank storage the wetland provides: <i>Estimate the average width of the wetland perpendicular to the direction of the flow of water and the width of the stream or river channel (distance between banks). Calculate the ratio: width of wetland / width of stream.</i> <ul style="list-style-type: none"> <li>• If the ratio is 2 or more ..... points =10 <input type="checkbox"/></li> <li>• If the ratio is between 1 and &lt; 2 ..... points = 8 <input type="checkbox"/></li> <li>• If the ratio is 1/2 to &lt; 1 ..... points = 4 <input type="checkbox"/></li> <li>• If the ratio is 1/4 to &lt; 1/2 ..... points = 2 <input type="checkbox"/></li> <li>• If the ratio is &lt; 1/4 ..... points = 1 <input type="checkbox"/></li> </ul> <p style="text-align: center;"><b>Aerial photo or map showing average widths</b></p>	Figure <input type="checkbox"/>
	R 3.2 Characteristics of vegetation that slow down water velocities during floods: <i>Treat large woody debris as "forest or shrub" (areas of polygons with &gt; 90% cover at person height. This is not Cowardin vegetation classes)</i> : <ul style="list-style-type: none"> <li>• Forest or shrub for more than 2/3 the area of the wetland..... points = 6 <input type="checkbox"/></li> <li>• Forest or shrub for &gt; 1/3 area OR herbaceous plants &gt; 2/3 area..... points = 4 <input type="checkbox"/></li> <li>• Forest or shrub for &gt; 1/10 area OR herbaceous plants &gt; 1/3 area..... points = 2 <input type="checkbox"/></li> <li>• Vegetation does not meet above criteria ..... points = 0 <input type="checkbox"/></li> </ul> <p style="text-align: center;"><b>Aerial photo or map showing polygons of different vegetation types</b></p>	Figure <input type="checkbox"/>
Total for R3		Add the points in the boxes above
<b>R 4</b>	<b>Does the wetland have the opportunity to reduce flooding and erosion?</b>	(see p.50)
	Answer NO if the major source of water is irrigation return flow or water levels are controlled by a reservoir. Answer YES if the wetland is in a location in the watershed where the flood storage, or reduction in water velocity it provides helps protect downstream property and aquatic resources from flooding or excessive and/or erosive flows. <i>Note which of the following conditions apply.</i> <ul style="list-style-type: none"> <li><input type="checkbox"/> There are human structures and activities downstream (roads, buildings, bridges, farms) that can be damaged by flooding.</li> <li><input type="checkbox"/> There are natural resources downstream (e.g. salmon redds) that can be damaged by flooding</li> <li><input type="checkbox"/> Other _____</li> </ul> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> multiplier is 2      <input type="checkbox"/> <b>NO</b> multiplier is 1</p>	Multiplier
<b>◆ TOTAL – Hydrologic Functions</b> Multiply the score from R3 by the multiplier in R4. <b>Record score on p.1 of field form.</b>		_____

Wetland name or number: \_\_\_\_\_

<b>L Lake-fringe Wetlands</b>		<b>Points</b>
WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.		(only 1 score per box)
<b>L 1</b>	<b>Does the wetland have the potential to improve water quality?</b>	(see p.52)
	L 1.1 Average width of vegetation along the lakeshore: • Vegetation is more than 33 ft. (10m) wide ..... points = 6 <input type="checkbox"/> • Vegetation is more than 16 ft.(5m) wide and < 33 ft wide ..... points = 3 <input type="checkbox"/> • Vegetation is 6 ft. (2m) wide to < 16 ft wide ..... points = 1 <input type="checkbox"/> <b>Map of Cowardin classes with widths marked</b>	Figure <input type="checkbox"/>
	L 1.2 Characteristics of the vegetation in the wetland: <i>Choose the appropriate description that results in the highest points, and do not include any open water in your estimate of coverage. The herbaceous plants can be either the dominant form or as an understory in a shrub or forest community. These are not Cowardin classes. Area of Cover is total cover in the unit, but it can be in patches. NOTE: Herbaceous does not include aquatic bed.</i> • Herbaceous plants cover > 90% of the vegetated area ..... points = 6 <input type="checkbox"/> • Herbaceous plants cover > 2/3 of the vegetated area ..... points = 4 <input type="checkbox"/> • Herbaceous plants cover > 1/3 of the vegetated area ..... points = 3 <input type="checkbox"/> • Other vegetation that is not aquatic bed in > 2/3 vegetated area ..... points = 3 <input type="checkbox"/> • Other vegetation that is not aquatic bed in > 1/3 vegetated area ..... points = 1 <input type="checkbox"/> • Aquatic bed cover > 2/3 of the vegetated area ..... points = 0 <input type="checkbox"/> <b>Map with polygons of different vegetation types</b>	Figure <input type="checkbox"/>
Total for L1		Add the points in the boxes above
<b>L 2</b>	<b>Does the wetland have the opportunity to improve water quality?</b>	(see p.53)
	Answer YES if you know or believe there are pollutants in the lake water, or surface water flowing through the wetland to the lake is polluted. <i>Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.</i> <input type="checkbox"/> Wetland is along the shores of a lake or reservoir that does not meet water quality standards <input type="checkbox"/> Grazing in the wetland or within 150 ft <input type="checkbox"/> Untreated stormwater flows into the wetland <input type="checkbox"/> Tilled fields or orchards within 150 ft. of wetland <input type="checkbox"/> Residential or urban areas are within 150 ft. of wetland <input type="checkbox"/> Powerboats with gasoline or diesel engines use the lake <input type="checkbox"/> Parks with grassy areas that are maintained, ballfields, golf courses (all within 150 ft. of shore of lake) <input type="checkbox"/> Other _____ <input type="checkbox"/> <b>YES</b> multiplier is 2 <input type="checkbox"/> <b>NO</b> multiplier is 1	Multiplier
◆	<b>TOTAL – Water Quality Functions</b>	Multiply the score from L1 by the multiplier in L2. <b>Record score on p.1 of field form.</b>
HYDROLOGIC FUNCTIONS – Indicators that wetland functions to reduce shoreline erosion.		
<b>L 3</b>	<b>Does the wetland have the potential to reduce shoreline erosion?</b>	(see p.54)
	L 3.1 Average width and characteristics of vegetation along the lakeshore ( <i>do not include aquatic bed</i> ): ( <i>choose the highest scoring description that matches conditions in the wetland</i> ) • > 3/4 of vegetation is shrubs or trees at least 33 ft. (10m) wide ..... points = 6 <input type="checkbox"/> • > 3/4 of vegetation is shrubs or trees at least 6 ft. (2m) wide ..... points = 4 <input type="checkbox"/> • > 1/4 of vegetation is shrubs or trees at least 33 ft. (10m) wide ..... points = 4 <input type="checkbox"/> • Vegetation is at least 6 ft. (2m) wide ..... points = 2 <input type="checkbox"/> • Vegetation is less than 6 ft. (2m) wide. .... points = 0 <input type="checkbox"/> <b>Aerial photo or map with Cowardin vegetation classes</b>	Figure <input type="checkbox"/>
<b>L 4</b>	<b>Does the wetland have the opportunity to reduce erosion?</b>	(see p. 55)
	Are there features along the shore that will be impacted if the shoreline erodes? <i>Note which of the following conditions apply.</i> <input type="checkbox"/> There are human structures and activities along the shore behind the wetland (buildings, fields) that can be damaged by erosion. <input type="checkbox"/> There are undisturbed natural resources along the shore (e.g. mature forests, other classes of wetland) behind the wetland that can be damaged by shoreline erosion. <input type="checkbox"/> Other _____ <input type="checkbox"/> <b>YES</b> multiplier is 2 <input type="checkbox"/> <b>NO</b> multiplier is 1	Multiplier
◆	<b>TOTAL – Hydrologic Functions</b>	Multiply the score from L3 by the multiplier L4. <b>Record score on p.1 of field form.</b>

Comments:

Wetland name or number: \_\_\_\_\_

<b>S Slope Wetlands</b>		<b>Points</b> (only 1 score per box)
WATER QUALITY FUNCTIONS – Indicators that wetland functions to improve water quality.		
<b>S 1</b>	<b>Does the wetland have the potential to improve water quality?</b>	(see p.56)
S 1.1	Characteristics of average slope of wetland: <ul style="list-style-type: none"> <li>• Slope is 1% or less (<i>a 1% slope has a 1 ft. vertical drop in elevation for every 100 ft. horizontal distance</i>) ..... points = 3</li> <li>• Slope is between 1% and 2% ..... points = 2</li> <li>• Slope is more than 2% but less than 5% ..... points = 1</li> <li>• Slope is 5% or greater ..... points = 0</li> </ul>	
S 1.2	The soil 2 inches below the surface is clay or organic, or smells anoxic ( <i>use NRCS definitions of soil types</i> ). <b>YES</b> = 3 points <b>NO</b> = 0 points	
S 1.3	Characteristics of the vegetation in the wetland that trap sediments and pollutants: <i>Choose the points appropriate for the description that best fits the vegetation in the wetland. Dense vegetation means you have trouble seeing the soil surface (&gt; 75% cover), and uncut means not grazed or mowed and plants are higher than 6 inches.</i> <ul style="list-style-type: none"> <li>• Dense, ungrazed, herbaceous vegetation &gt; 90% of the wetland unit ..... points = 6</li> <li>• Dense, ungrazed, herbaceous vegetation &gt; 1/2 of unit ..... points = 3</li> <li>• Dense, woody, vegetation &gt; 1/2 of unit ..... points = 2</li> <li>• Dense, ungrazed, herbaceous vegetation &gt; 1/4 of unit ..... points = 1</li> <li>• Does not meet any of the criteria above for herbaceous vegetation ..... points = 0</li> </ul> <b>Aerial photo or map with vegetation polygons</b>	<b>Figure</b> <input type="checkbox"/>
Total for S 1		Add the points in the boxes above
<b>S 2</b>	<b>Does the wetland have the opportunity to improve water quality?</b> Answer YES if you know or believe there are pollutants in groundwater or surface water coming into the wetland that would otherwise reduce water quality in streams, lakes or groundwater downgradient from the wetland? <i>Note which of the following conditions provide the sources of pollutants. A unit may have pollutants coming from several sources, but any single source would qualify as opportunity.</i> <input type="checkbox"/> Grazing in the wetland or within 150 ft <input type="checkbox"/> Wetland is a groundwater seep within the Reclamation Area <input type="checkbox"/> Untreated stormwater flows through the wetland <input type="checkbox"/> Tilled fields, logging, or orchards within 150 ft. of wetland <input type="checkbox"/> Residential, urban areas, golf courses are within 150 ft. upslope of wetland <input type="checkbox"/> Other _____ <input type="checkbox"/> <b>YES</b> multiplier is 2 <input type="checkbox"/> <b>NO</b> multiplier is 1	(see p. 58)  Multiplier
<b>◆</b>	<b>TOTAL – Water Quality Functions</b>	Multiply the score from S1 by the multiplier in S2. <b>Record score on p.1 of field form.</b>
HYDROLOGIC FUNCTIONS – Indicators that wetland functions to reduce flooding and stream erosion.		
<b>S 3</b>	<b>Does the wetland unit have the potential to reduce flooding and stream erosion?</b>	(see p.59)
S 3.1	Characteristics of vegetation that reduce the velocity of surface flows during storms: <i>Choose the points appropriate for the description that best fits conditions in the wetland. See questions S 1.3 for definition of dense and uncut. Rigid means that the stems of plants should be thick enough (usually &gt; 1/8 in), or dense enough to remain erect during surface flows.</i> <ul style="list-style-type: none"> <li>• Dense, uncut, <b>rigid</b> vegetation covers &gt; 90% of the area of the unit ..... points = 6 <input type="checkbox"/></li> <li>• Dense, uncut, <b>rigid</b> vegetation &gt; 1/2 – 90% area of unit ..... points = 3 <input type="checkbox"/></li> <li>• Dense, uncut, <b>rigid</b> vegetation &gt; 1/4 – 1/2 of unit ..... points = 1 <input type="checkbox"/></li> <li>• More than 1/4 of area is grazed, mowed, tilled, or vegetation is not rigid ..... points = 0 <input type="checkbox"/></li> </ul>	
S 3.2	Characteristics of slope wetland that holds back small amounts of flood flows. The slope has small surface depressions that can retain water over at least 10% of its area. <input type="checkbox"/> <b>YES</b> = 2 points <input type="checkbox"/> <b>NO</b> = 0 points	
Total for S3		Add the points in the boxes above
<b>S 4</b>	<b>Does the wetland unit have the opportunity to reduce flooding and erosion?</b> (see p. 61) Answer NO if the major source of water is irrigation return flow (e.g. a seep that is on the downstream side of a dam or at the base of an irrigated field. Answer YES if the wetland is in a landscape position where the reduction in water velocity it provides helps protect downstream property and aquatic resources fro flooding or excessive and/or erosive flows. <i>Note which of the following conditions apply.</i> <input type="checkbox"/> Wetland has surface runoff that can cause flooding problems downgradient <input type="checkbox"/> Other _____ <input type="checkbox"/> <b>YES</b> multiplier is 2 <input type="checkbox"/> <b>NO</b> multiplier is 1	Multiplier
<b>◆</b>	<b>TOTAL – Hydrologic Functions</b>	Multiply the score from S3 by S4. <b>Record score on p.1 of field form.</b>

Comments: \_\_\_\_\_



Wetland name or number: \_\_\_\_\_

	<p>H 1.6 <b>Special Habitat Features</b> (see p. 68)  <i>Check the habitat features that are present in the wetland unit. The number of checks is the number of points you put into the next column.</i></p> <p><input checked="" type="checkbox"/> Loose rocks larger than 4" <b>or</b> large, downed, woody debris (&gt; 4 in. diameter) within the area of surface ponding or in stream</p> <p><input checked="" type="checkbox"/> Cattails or bulrushes are present within the unit</p> <p><input type="checkbox"/> Standing snags (diameter at the bottom &gt; 4 inches) in the wetland unit or within 30m (100 ft) of the edge</p> <p><input type="checkbox"/> Emergent or shrub vegetation in areas that are permanently inundated/ponded. <i>The presence of "yellow flag" Iris is a good indicator of vegetation in areas permanently ponded.</i></p> <p><input type="checkbox"/> Stable steep banks of fine material that might be used by beaver or muskrat for denning (&gt; 45 degree slope) <b>OR</b> signs of recent beaver activity</p> <p><input type="checkbox"/> Invasive species cover less than 20% in each stratum of vegetation (<i>canopy, sub-canopy, shrubs, herbaceous, moss/ground cover</i>)</p> <p style="text-align: right;">Maximum score possible = 6</p>	1
<p><b>H 1 TOTAL Score</b> – potential to provide habitat <span style="float: right;"><i>Add the scores in the column above</i></span></p>		7
<p><b>H 2 Does the wetland have the opportunity to provide habitat for many species?</b></p>		(only 1 score per box)
	<p>H 2.1 <b>Buffers</b> (see P. 71):  <i>Choose the description that best represents condition of buffer of wetland unit. The highest scoring criterion that applies to the wetland is to be used in the rating. See text for definition of "undisturbed". Relatively undisturbed also means no grazing, no landscaping, no daily human use, and no structures or paving within undisturbed part of buffer.</i></p> <p><input type="checkbox"/> 330 ft (100m) of relatively undisturbed vegetated areas, rocky areas, or open water &gt; 95% of circumference..... <b>points = 5</b></p> <p><input type="checkbox"/> 330 ft (100m) of relatively undisturbed vegetated areas, rocky areas, or open water &gt; 50% circumference..... <b>points = 4</b></p> <p><input type="checkbox"/> 170 ft (50m) of relatively undisturbed vegetated areas, rocky areas, or open water &gt; 95% circumference..... <b>points = 4</b></p> <p><input type="checkbox"/> 330 ft (100m) of relatively undisturbed vegetated areas, rocky areas, or open water &gt; 25% circumference..... <b>points = 3</b></p> <p><input type="checkbox"/> 170 ft (50m) of relatively undisturbed vegetated areas, rocky areas, or open water for &gt; 50% circumference..... <b>points = 3</b></p> <p><b>If buffer does not meet any of the three criteria above:</b></p> <p><input type="checkbox"/> No paved areas (except paved trails) or buildings within 80 ft (25m) of wetland &gt; 95% circumference. Light to moderate grazing or lawns are OK..... <b>points = 2</b></p> <p><input type="checkbox"/> No paved areas of buildings within 170 ft (50m) of wetland for &gt; 50% circumference. Light to moderate grazing or lawns are OK..... <b>points = 2</b></p> <p><input type="checkbox"/> Heavy grazing in buffer..... <b>points = 1</b></p> <p><input type="checkbox"/> Vegetated buffers are &lt; 6.6 ft wide (2m) for more than 95% of the circumference (e.g. tilled fields, paving, basalt bedrock extend to edge of wetland)..... <b>points = 0</b></p> <p><input checked="" type="checkbox"/> Buffer does not meet any of the criteria above..... <b>points = 1</b></p>	<p>Figure <input type="checkbox"/></p> <p style="text-align: center;">1</p>
	<p>H 2.2 <b>Wet Corridors</b> (see p. 72)</p> <p>H 2.2.1 Is the wetland part of a relatively undisturbed and unbroken, &gt; 30 ft. wide, vegetated corridor at least 1/4 mile long with surface water or water flowing water throughout most of the year (&gt; 9 months/yr?) (dams, heavily used gravel roads, paved roads, fields tilled to edge of stream, or pasture to edge of stream are considered breaks in the corridor).</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES = 4 points</b> (go to H 2.3)                      <input checked="" type="checkbox"/> <b>NO = go to H 2.2.2</b></p> <p>H. 2.2.2 Is the unit part of a relatively undisturbed and unbroken, &gt; 30 ft. wide, vegetated corridor, at least 1/4 mile long with water flowing seasonally, <b>OR</b> a lake-fringe wetland without a "wet" corridor, <b>OR</b> a riverine wetland without a surface channel connecting to the stream?</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES = 2 points</b> (go to H 2.3)                      <input checked="" type="checkbox"/> <b>NO = go to H 2.2.3</b></p> <p>H. 2.2.3 Is the wetland within 1/2 mile of any permanent stream, seasonal stream, or lake (<i>do not include man-made ditches</i>)?</p> <p style="text-align: center;"><input checked="" type="checkbox"/> <b>YES = 1 point</b>    <input type="checkbox"/> <b>NO = 0 points</b></p>	1

Comments: \_\_\_\_\_

Wetland name or number: \_\_\_\_\_

	<p>H 2.3 Near or adjacent to other priority habitats listed by WDFW (<i>see new and complete descriptions of WDFW priority habitats, and the counties in which they can be found, in the PHS report <a href="http://wdfw.wa.gov/hab/phslist.htm">http://wdfw.wa.gov/hab/phslist.htm</a></i>). Which of the following priority habitats are within 330ft (100m) of the wetland unit?  <i>NOTE: the connections to the habitats can be disturbed.</i></p> <p><input type="checkbox"/> <b>Aspen Stands:</b> Pure or mixed stands of aspen greater than 0.4 ha (1 acre).</p> <p><input type="checkbox"/> <b>Biodiversity Areas and Corridors:</b> Areas of habitat that are relatively important to various species of native fish and wildlife (may include urban or urban growth areas) (<i>full descriptions in WDFW PHS report p. 152</i>).</p> <p><input type="checkbox"/> <b>Eastside Steppe:</b> Non-forested vegetation type dominated by broadleaf herbaceous flora (i.e., forbs), perennial bunchgrasses, or a combination of both (<i>full description of species found here in WDFW PHS report p. 153</i>).</p> <p><input type="checkbox"/> <b>Old-growth/Mature forests (east of Cascade crest):</b> (<i>full descriptions in WDFW PHS report p. 157</i>). Old-growth: Stands are &gt; 150 yrs in age; may be variable in tree species composition and structural characteristics due to the influence of fire, climate, and soils. Mature: Stands 80 – 160 yrs old. Decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth.</p> <p><input type="checkbox"/> <b>Oregon white Oak:</b> Woodlands Stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (<i>full descriptions in WDFW PHS report p. 158</i>).</p> <p><input type="checkbox"/> <b>Juniper Savannah:</b> All juniper woodlands (<i>SE part of state only; check map</i>)</p> <p><input type="checkbox"/> <b>Shrub-steppe:</b> A nonforested vegetation type consisting of one or more layers of perennial bunchgrasses and a conspicuous but discontinuous layer of shrubs (see Eastside Steppe for sites with little or no shrub cover).</p> <p><input type="checkbox"/> <b>Riparian:</b> The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.</p> <p><input type="checkbox"/> <b>Inland Dunes</b> This placeholder is for a new priority habitat that will capture areas known as Inland Dunes. A definition will be developed later in Fall 2008. (<i>check WDFW web site</i>)</p> <p><input checked="" type="checkbox"/> <b>Instream:</b> The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.</p> <p><input type="checkbox"/> <b>Caves:</b> A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.</p> <p><input type="checkbox"/> <b>Cliffs:</b> Greater than 7.6 m (25 ft) high and occurring below 5000 ft.</p> <p><input type="checkbox"/> <b>Talus:</b> Homogenous areas of rock rubble ranging in average size 0.15 - 2.0 m (0.5 - 6.5 ft), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.</p> <p><input type="checkbox"/> <b>Snags and Logs:</b> Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of &gt; 30 cm (12 in) in eastern Washington and are &gt; 2 m (6.5 ft) in height. Priority logs are &gt; 30 cm (12 in) in diameter at the largest end, and &gt; 6 m (20 ft) long.</p> <p style="text-align: right;">If wetland has <b>2 or more</b> Priority Habitats = <b>4 points</b>          If wetland has <b>1</b> Priority Habitat = <b>2 points</b>          No Priority habitats = <b>0 points</b></p> <p><i>Note: All vegetated wetlands are by definition a priority habitat but are not included in this list. Nearby wetlands are addressed in H 2.4)</i></p>	2
	<p>H 2.4 <u>Landscape:</u> Choose the <b>one</b> description of the landscape around the wetland that best fits. (<i>see p. 76</i>)</p> <ul style="list-style-type: none"> <li>• The wetland unit is in an area where annual rainfall is less than 12 inches, and its water regime is not influenced by irrigation practices, dams, or water control structures. (<i>Generally, this means outside boundaries of reclamation areas, irrigation district, or reservoirs.</i>)..... points = 5 <input type="checkbox"/></li> <li>• There are at least 3 other wetlands within 1/2 mile, and the connections between them are relatively undisturbed (light grazing in the connection or an open water connection along a lake shore without heavy boat traffic are OK, but connections should NOT be bisected by paved roads, fill, fields, heavy boat traffic or other development..... points = 5 <input type="checkbox"/></li> <li>• There are at least 3 other wetlands within 1/2 mile, BUT the connections between them are disturbed. .... points = 2 <input checked="" type="checkbox"/></li> <li>• There is at least 1 wetland within 1/2 mile ..... points = 1 <input type="checkbox"/></li> <li>• Does not meet any of the four criteria above ..... points = 0 <input type="checkbox"/></li> </ul>	2
<b>H 2 TOTAL Score – opportunity for providing habitat</b> <i>Add the scores in the columns above</i>		<b>6</b>
<b>H 3 Does the wetland unit have indicators that its ability to provide habitat is reduced?</b>		
	<p>H 3.1 <u>Indicator of reduced habitat functions</u> (<i>see p. 75</i>)          Do the areas of open water in the wetland unit have a resident population of carp (see text for indicators of the presence of carp)? Note: <i>This question does not apply to reservoirs with water levels controlled by dams, such as the reservoirs on the Columbia and Snake Rivers.</i></p> <p><input type="checkbox"/> <b>YES = 5 points</b> <span style="margin-left: 200px;"><input checked="" type="checkbox"/> <b>NO = 0 points</b></span></p>	<i>Points will be subtracted</i> 0
<b>◆ Total Score for Habitat Functions</b> <i>Add the points for H 1, H 2 and H 3; and record the result on p. 1</i>		<b>13</b>

Comments: \_\_\_\_\_



Wetland name or number: \_\_\_\_\_

### CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

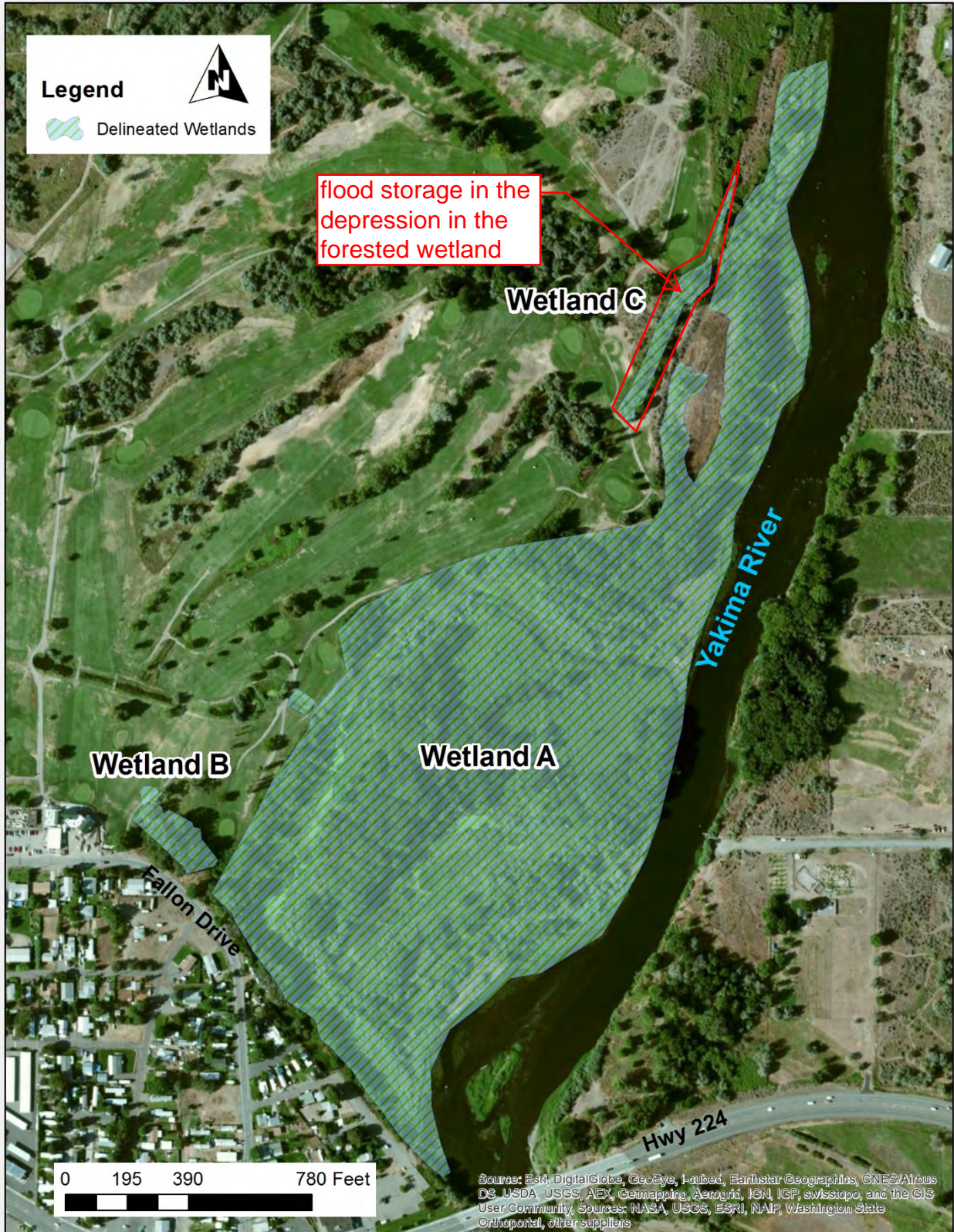
*Please determine if the wetland meets the attributes described below and circle the appropriate Category. NOTE: A wetland may meet the criteria for more than one set of special characteristics. Record all those that apply. NOTE: All units should also be characterized based on their functions.*

<b>Wetland Type</b> – Check off any criteria that apply to the wetland. Circle the Category when the appropriate criteria are met.	
<b>SC1</b>	<p><b>Vernal pools</b> (see p.79)</p> <p>Is the wetland unit <b>less than 4,000 ft<sup>2</sup></b>, and does it meet at least <b>two</b> of the following criteria?</p> <p><input type="checkbox"/> Its only source of water is rainfall or snowmelt from a small contributing basin and has no groundwater input.</p> <p><input type="checkbox"/> Wetland plants are typically present only in the spring; the summer vegetation is typically upland annuals. <i>NOTE: If you find perennial, “obligate”, wetland plants the wetland is probably NOT a vernal pool.</i></p> <p><input type="checkbox"/> The soil in the wetland are shallow (&lt;1 ft. deep (30cm) and is underlain by an impermeable layer such as basalt or clay.</p> <p><input type="checkbox"/> Surface water is present for less than 120 days during the “wet” season.</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> = Go to SC 1.1                      <input checked="" type="checkbox"/> <b>NO</b> not a vernal pool</p>
	<p>SC 1.1 Is the vernal pool relatively undisturbed in February and March?</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> = Go to SC 1.2                      <input type="checkbox"/> <b>NO</b> = not a vernal pool with special characteristics</p>
	<p>SC 1.2 Is the vernal pool in an area where there are at least 3 separate aquatic resources within 0.5 miles (other wetlands, rivers, lakes etc.)?</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> = Category II                      <input type="checkbox"/> <b>NO</b> = Category III</p> <p style="text-align: right;"><input type="checkbox"/> <b>Cat. II</b> <input type="checkbox"/> <b>Cat. III</b></p>
<b>SC2</b>	<p><b>Alkali wetlands</b> (see p.81)</p> <p>Does the wetland unit meet <b>one</b> of the following two criteria?</p> <p><input type="checkbox"/> The wetland has a conductivity &gt; 3.0 mS/cm.</p> <p><input type="checkbox"/> The wetland has a conductivity between 2.0 – 3.0 mS, and more than 50% of the plant cover in the wetland can be classified as “alkali” species (see Table 2 for list of plants found in alkali systems).</p> <p><input type="checkbox"/> If the wetland is dry at the time of your field visit, the central part of the area is covered with a layer of salt.</p> <p><b>OR</b> does the wetland meet <b>two</b> of the following three sub-criteria?</p> <p><input type="checkbox"/> Salt encrustations around more than 80% of the edge of the wetland.</p> <p><input type="checkbox"/> More than 3/4 of the plant cover consists of species listed on Table 2.</p> <p><input type="checkbox"/> A pH above 9.0. All alkali wetlands have a high pH, but please note that some freshwater wetlands may also have a high pH. Thus, pH alone is not a good indicator of alkali wetlands.</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> = Category I                      <input checked="" type="checkbox"/> <b>NO</b> – not an alkali wetland</p> <p style="text-align: right;"><b>Cat. I</b> <input type="checkbox"/></p>
<b>SC3</b>	<p><b>Natural Heritage Wetlands</b> (see p. 82)</p> <p>Natural Heritage wetlands have been identified by the Washington Natural Heritage Program/DNR as either high quality undisturbed wetlands or wetlands that support state Threatened, Endangered, or Sensitive plant species.</p> <p>SC 3.1 Is the wetland unit being rated in a Section/Township/Range that contains a natural heritage wetland? (This question is used to screen out most sites before you need to contact WNHP/DNR.)</p> <p>S/T/R information from Appendix D <input type="checkbox"/> or accessed from WNHP/DNR web site <input type="checkbox"/></p> <p style="text-align: center;"><b>YES</b> <input type="checkbox"/> Contact WNHP/DNR (see p. 79) and go to SC 3.2                      <b>NO</b> <input type="checkbox"/></p> <p>SC 3.2 Has DNR identified the wetland unit as a high quality undisturbed wetland or as a site with state threatened or endangered plant species?</p> <p style="text-align: center;"><input type="checkbox"/> <b>YES</b> = Category I                      <input checked="" type="checkbox"/> <b>NO</b> – not a natural heritage wetland</p> <p style="text-align: right;"><b>Cat. I</b> <input type="checkbox"/></p>

Wetland name or number: \_\_\_\_\_

<p><b>SC4</b></p>	<p><b>Bogs</b> (see p. 82)          Does the wetland unit (<b>or any part of the wetland unit</b>) meet both the criteria for soils and vegetation in bogs? Use the key below to identify if the wetland is a bog. <i>If you answer yes you will still need to rate the wetland based on its functions.</i></p> <p>SC 4.1 Does the wetland have organic soil horizons (i.e. layers of organic soil), either peats or mucks, that compose 16 inches or more of the first 32 inches of the soil profile? (See Appendix B for a field key to identify organic soils.)  <input type="checkbox"/> <b>YES</b> = go to SC 4.3      <input checked="" type="checkbox"/> <b>NO</b> = go to SC 4.2</p> <p>SC 4.2 Does the wetland have organic soils, either peats or mucks that are less than 16 inches deep over bedrock or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond?  <input type="checkbox"/> <b>YES</b> = go to 4.3      <input checked="" type="checkbox"/> <b>NO</b> = Is not a bog for rating</p> <p>SC 4.3 Does the wetland have more than 70% cover of mosses at ground level in any area within its boundaries, AND other plants, if present, consist of the “bog” species listed in Table 3 as a significant component of the vegetation (more than 30% of the total shrub and herbaceous cover consists of species in Table 3)?  <input type="checkbox"/> <b>YES</b> = Category I bog      <input checked="" type="checkbox"/> <b>NO</b> = go to question 4.4</p> <p>NOTE: <i>If you are uncertain about the extent of mosses in the understory you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16” deep. If the pH is less than 5.0 and the “bog” plant species in Table 3 are present, the wetland is a bog.</i></p> <p>SC 4.4 Is the unit, or any part of it, forested (&gt; 30% cover) with sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Englemann’s spruce, or western white pine, WITH any of the species (or combination of species) on the bog species plant list in Table 3 as a significant component of the ground cover (&gt; 30% coverage of the total shrub/herbaceous cover)?  <input type="checkbox"/> <b>YES</b> = Category 1 bog      <input checked="" type="checkbox"/> <b>NO</b></p>	<p><b>Cat. I</b>  <input type="checkbox"/></p>
<p><b>SC5</b></p>	<p><b>Forested Wetlands</b> (see p. 85)          Does the wetland unit have an area of forest (<i>you should have identified a forested class, if present, in question H 1.1</i>) rooted within its boundary that meet <b>at least one</b> of the following three criteria?  <input checked="" type="checkbox"/> The wetland is within the “100 year” floodplain of a river or stream.  <input type="checkbox"/> Aspen (<i>Populus tremuloides</i>) are a dominant or co-dominant of the “woody” vegetation. (<i>Dominant means it represents at least 50% of the cover of woody species, co-dominant means it represents at least 20% of the total cover of woody species.</i>)  <input type="checkbox"/> There is at least 1/4 acre of trees (even in wetlands smaller than 2.5 acres) that are “mature” or “old-growth” according to the definitions for these priority habitats developed by WDFW (see p. 83).  <input checked="" type="checkbox"/> <b>YES</b> = go to SC 5.1      <input type="checkbox"/> <b>NO</b> – not a forested wetland with special characteristics</p>	<p style="background-color: #cccccc;"></p>
	<p>SC 5.1 Does the wetland unit have a forest canopy where more than 50% of the tree species (by cover) are slow growing native trees? Slow growing trees are: western red cedar (<i>Thuja plicata</i>), Alaska yellow cedar (<i>Chamaecyparis nootkatensis</i>), pine spp. mostly “white” pine (<i>Pinus monticola</i>), western hemlock (<i>Tsuga heterophylla</i>), Englemann spruce (<i>Picea engelmannii</i>)?  <input type="checkbox"/> <b>YES</b> = Category I      <input checked="" type="checkbox"/> <b>NO</b> = go to SC 5.2</p>	<p><b>Cat. I</b>  <input type="checkbox"/></p>
	<p>SC 5.2 Does the unit have areas where aspen (<i>Populus tremuloides</i>) as a dominant or co-dominant species?  <input type="checkbox"/> <b>YES</b> = Category I      <input checked="" type="checkbox"/> <b>NO</b> = go to SC 5.3</p>	<p><b>Cat. I</b>  <input type="checkbox"/></p>
	<p>SC 5.3 Does the wetland unit have a forest canopy where more than 50% of the tree species (by cover) are fast growing species? Fast growing species are: Alders – red (<i>alnus rubra</i>), thin-leaf (<i>A. tenuifolia</i>); Cottonwoods – narrow-leaf (<i>Populus angustifolia</i>), black (<i>P. balsamifera</i>); Willows – peach-leaf (<i>Salix amygdaloides</i>), Sitka (<i>S. sitchensis</i>), Pacific (<i>S. lasiandra</i>), Aspen – <i>Populus tremuloides</i>, Water Birch (<i>Betula occidentalis</i>)  <input type="checkbox"/> <b>YES</b> = Category II      <input checked="" type="checkbox"/> <b>NO</b> = go to SC 5.5</p>	<p><b>Cat. II</b>  <input type="checkbox"/></p>
	<p>SC 5.5 Is the forested component of the wetland within the “100 year floodplain” of a river or stream?  <input checked="" type="checkbox"/> <b>YES</b> = Category II</p>	<p><b>Cat. II</b>  <input checked="" type="checkbox"/></p>
<p>◆</p>	<p><b>Category of wetland based on Special Characteristics</b>  <i>Choose the “highest” rating if wetland falls into several categories.</i>          If you answered <b>NO</b> for all types enter “Not Applicable” on p. 1</p>	<p><b>II</b></p>

Figure 1  
Wetland Assessment Unit Wetland C



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## APPENDIX C. PHOTOS



*DP1 by existing Kayak pullout*



*DP3 by veranda*



*DP6*



*DP8*



DP11



DP12



*DPI4*



*Raised ant mound near path upslope of Wetland C*





*Upland berm with sagebrush*



*Edge of willow stand west side of Wetland A*



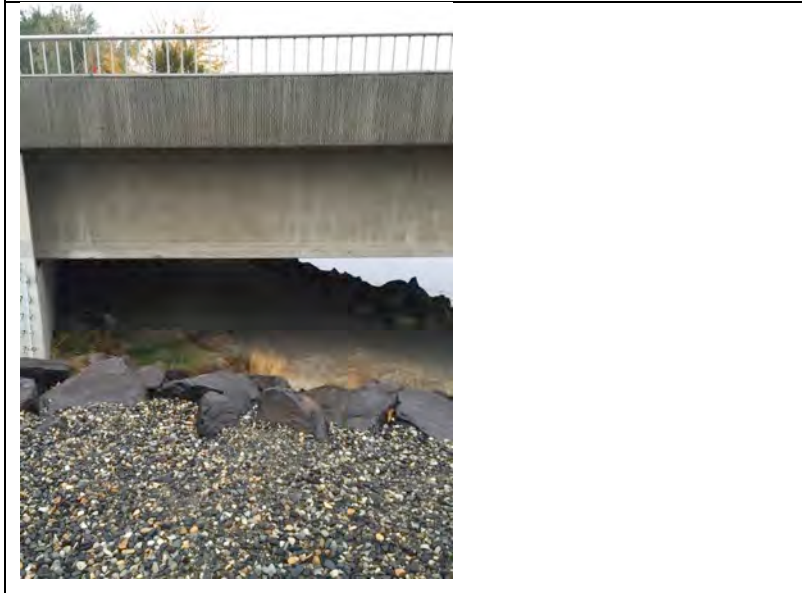
*Upland rose thicket west of northwest of Wetland A*



*DP21*



*Cul-de-sac south of bridge*



*Southwest abutment facing north*



*Under west side of bridge facing north*

## APPENDIX D: GEOTECHNICAL REPORT



Consulting Engineers Environmental Scientists Construction Materials Testing

December 15, 2015

GNN Project No. 214-542

MacKay Sposito  
7601 Clearwater Avenue, Suite 405  
Kennewick, WA 99336

Attention: Mr. Bryan Cole, Director of Landscape Architecture and Planning

**Subject: Addendum 1 – Response to Army Corp of Engineers 408 Permit Review Comments Yakima River Gateway Project, West Richland, Washington**

Reference: GN Northern, Inc., *Report for Geotechnical Investigation for Flood/Retaining Wall Design, Yakima River Gateway Project, Yakima River & Highway 224, West Richland, Benton County, Washington*, GNN Project No. 214-542, July 2, 2015

Schaffer, Michael, PE, U.S. Army Corps of Engineers – Walla Walla District Office, *West Richland Levee – Yakima River Gateway Project, 408 Permit Review Comments*, dated October 21, 2015

Mr. Cole:

GN Northern (GNN) is pleased to submit this addendum letter presenting our responses to the 408 Permit review comments provided by Mr. Michael Schaffer, PE, with the Walla Walla District Office of the U.S. Army Corps of Engineers (USACE). This addendum letter is intended to address the expressed concerns relating to the referenced geotechnical engineering report prepared by GNN, including:

- Incorporation of the final flood/retaining wall designs and temporary cut slope configurations;
- Embankment stability using multiple methods of analyses including non-circular slip failures;
- Stability analysis of temporary construction slopes;
- Discussion regarding parameters used for seismic stability analyses;
- Recommendations regarding placement of engineered fill soils and re-construction of embankments;
- Seepage analysis and discussion regarding risk of under-seepage;
- Settlement analysis of the proposed flood/retaining walls;
- Discussion of constructability concerns including construction dewatering and subgrade protection;
- Additional discussion regarding cement-treated subgrade soil & aggregate improvements.

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In order to clearly and fully address any request for clarifications, additional analyses, and expressed concerns that USACE may have regarding the proposed levee modifications relating to the Yakima River Gateway Project, we have broken-out and copied the various review comments from Mr. Schaffer (referenced 408 Permit review comment memo), followed by our responses.

### ***Slope Stability Analyses: Revised Models***

#### USACE Comments:

- ✓ *“Slope stability analyses do not match wall design geometry from the Structural Engineer”*
- ✓ *“It appears that the soil strength parameters selected for design based on SPT blow counts, gradation test results, and moisture contents yield slope stability factors of safety that are not acceptable. At a minimum, Atterberg limits testing should be completed to justify soil cohesion values for use in analyses. Additional explorations should be considered to allow field soil strength tests or sampling and laboratory strength tests for use in slope stability analyses.”*
- ✓ *“Typical Wall Sections show the retaining walls with geometry that does not appear entirely consistent with what is in the Geotechnical Report or the Plan information by Gokey Lane Rasmussen”*
- ✓ *“Reported FS values correspond to shallow slope sloughing that merits analyses and discussion, but does not apply to stability risks for the public”*

#### GNN Response:

The referenced geotechnical report provided a review of embankment stability analyses based on preliminary retaining wall cross-sections prior to completion of the final structural designs for the project. The preliminary designs included a centralized wall over an evenly split toe and heel foundation configuration, while the final structural walls designs rely heavily on a heel foundation. We have completed a set of revised stability analyses for the project levee embankment and proposed flood/retaining wall system. The updated models used for stability analyses incorporate the final structural design of the flood/retaining walls (Detail 9 / Sheet S3.0 prepared by Gokey Engineering)

It should be noted that layering of the subsurface soil stratum was modeled with a linear/horizontal projection of the subsurface boundaries based on data obtained from our exploratory borings completed at

the riverside edge of the levee crest, and represents a two-dimensional “idealization” of a given cross-section. Engineering and geologic judgment was applied to estimate conservative shear strength parameters for use in our stability analyses. As discussed in the referenced geotechnical report and Section 3-3 of EM 1110-2-1913, the selection of presumptive unit weight and shear strength parameters for the various onsite earth materials encountered were based on judgment and data obtained during our investigation, laboratory testing, extensive review of previous studies, and published research and prior experience with similar materials in comparable geotechnical and geologic settings.

Although previously not included as a factor in our slope stability model, the revised levee embankment models include a layer of rip-rap protection on the face of the slope, extending to an assumptive point beneath the ordinary high water elevation. This protective veneer on the levee model provides added benefit by reducing shallow surficial failures along the face of the slope. As described in Section 1-7 of EM 1110-2-1902, *surface sloughing is considered a maintenance problem and does not affect the structural capability of the embankment.* An estimated value of 145 pcf was used for the dry unit weight of the rip-rap, with an internal angle of friction of 40-degrees. We recommend that placement of rip-rap be completed in accordance with EM 1110-2-2502.

### ***Slope Stability Analyses: Temporary/Construction Cut Slopes***

#### USACE Comments:

- ✓ *“The proposed improvements involve extensive excavations along the levee slope that will intrude into the levee cross section with relatively tall exposed excavation slopes. If shoring will be used, Shoring Plan level design drawings should be submitted for review; if excavations will be sloped, Excavation Plan drawings should be provided. Additionally, the Geotechnical Report should provide recommendations for replacing the levee cross section behind the retaining walls. (Both excavation conditions should be analyzed for slope stability during construction.)”*
- ✓ *“This will result in excavations intruding into the levee cross section much more than the 2-ft foundation elements shown in the geotechnical report. Slope stability analyses should be completed with design foundation and foundation overexcavation backfill geometry.”*
- ✓ *“Slope stability analyses for various slope conditions during construction have not been presented. Analyses should include conditions with open foundation excavations.”*
- ✓ *“The excavation geometry should be evaluated for the During Construction slope stability analyses.”*



GNN Response:

Temporary cut slopes will be necessary for over-excavation to the retaining wall foundation subgrade elevations during construction. Temporary cut slope configurations for each of the proposed design sections were analyzed for appropriate short-term stability (FS of 1.1) to achieve the optimum safe cut temporary slope gradient. Based on our stability analyses (Table 2), we recommend that temporary cut slopes be graded at a maximum slope gradient of 1.5H:1V.

***Slope Stability Analyses: Selection of Seismic Parameters***

USACE Comment:

*“There is uncertainty regarding how the seismic analyses were completed”*

GNN Response:

Our analysis of seismic slope stability used the pseudostatic method which modifies the limit equilibrium method by incorporating a horizontal seismic force to simulate the potential inertial forces generated from earthquake ground accelerations. For slope stability analyses under seismic loading, a pseudostatic seismic coefficient,  $k_h$  (horizontal component), expressed in terms of acceleration (units of g), is typically estimated as a percentage of the horizontal peak ground acceleration (PGA).

Based on ER 1110-2-1806, the PGA for this site was calculated for the Maximum Design Earthquake (MDE) with a 950-year return interval (RI) using the USGS PSH Deaggregation tool for a 10% probability of exceedance in 100 years. For our analyses, we have selected a value of  $k_h = 0.0984g$ , approximately two-thirds (2/3) of the design PGA of 0.1476g, as suggested in section 4-7 of EM 1110-2-2100.

Section 6-5 of EM 1110-2-1913 suggests that seismic analysis depends on the *severity of the expected earthquake and the importance of the levee*. The West Richland area is considered to be within a region of relatively lower seismic activity/intensity. The results of our seismic slope stability analyses (Table 2 & Table 3) indicate that the existing embankment represents the lowest estimated safety factor under seismic loading, while the proposed design flood/retaining wall system results in improved factors of safety.

***Slope Stability Analyses: Re-Analyses of Rapid Drawdown Condition***

USACE Comment:

*“Rapid drawdown assumptions appear to be overly conservative.”*

GNN Response:

Proposed flood/retaining walls and design slopes were analyzed for global stability of the rapid drawdown condition using the multi-stage drawdown procedure described by Duncan, Wright, and Wong (1990), as suggested in section 2-5 of EM 1110-2-1902. Design sections were modeled with an initial water table at the design flood elevation lowering down to a final (drawdown) water table at the ordinary high water elevation. Undrained shear strength parameters used for the second-stage computations were estimated based on values presented by Duncan, Byrne, Wong, and Marby (1980). A summary of these shear strength parameters (drained and undrained) for each of the soil types are presented below:

**Table 1: Estimated Shear Strength Parameters**

Soil Type	Drained		Undrained	
	c' (psf)	Φ (degrees)	C <sub>R</sub> (psf)	Φ <sub>R</sub> (degrees)
Berm Fill	0	38	0	37
Sandy Silt	50	31	200	30
Sandy Gravel	0	35	0	34
Silt with Sand / Silty Sand	0	31	150	30
Silty Sandy Gravel	0	38	0	37
Silt	250	28	300	27
Crushed Rock	0	45	0	44
Compacted Backfill	25	34	50	33
Rip Rap	0	40	0	40

***Slope Stability Analyses: Improved Safety Factors***

USACE Comment:

*“Design requirements are referenced, but recommended design appears to yield inadequate factors of safety.”*

*“The Geotechnical Report includes analyses for slope stability that do not meet criteria.”*

GNN Response:

As suggested in Section 4-1 of EM 1110-2-1902, the existing levee embankment and proposed slopes with the design floodwall geometries were analyzed for stability using various additional methods. In

In addition to the previously used Simplified Bishop Method of analysis, factors of safety for slope stability were calculated using the Spencer's Method as suggested in Section 1-6 of EM 1110-2-1902. The Spencer's Method fully satisfies the requirements for both force and moment equilibrium. This method is also applicable to analyses with noncircular slip surfaces. Other methods available within the SLIDE program were also checked and found to yield relatively similar factors of safety, typically within an approximate range of  $\pm 0.1$ .

A summary of the safety factors resulting from circular slope stability analyses using the Spencer's Method is presented in the Table 2 below. The presented safety factors represent deep-seated failure slip surfaces:

**Table 2: Summary of Circular Slope Stability Analysis using Spencer's Method**

<b>Slope Analyzed</b>	<b>Design Condition</b>	<b>Factor of Safety (Static)</b>	<b>Factor of Safety (Seismic)</b>
Existing Levee (Section C-C')	Steady-State Seepage @ OHWE	1.26	0.99
	Steady-State Seepage @ DFE	1.41	1.00
	Multi-Stage Rapid Drawdown	1.21	-
Section A-A'	End of Construction	2.30	1.86
	Steady-State Seepage @ OHWE	1.44	1.08
	Steady-State Seepage @ DFE	1.66	1.09
	Multi-Stage Rapid Drawdown	1.31	-
	During Construction	1.14	-
Section B-B'	End of Construction	2.44	1.94
	Steady-State Seepage @ OHWE	1.46	1.10
	Steady-State Seepage @ DFE	1.73	1.16
	Multi-Stage Rapid Drawdown	1.36	-
	During Construction	1.15	-
Section C-C'	End of Construction	2.12	1.75
	Steady-State Seepage @ OHWE	1.40	1.10
	Steady-State Seepage @ DFE	1.54	1.11
	Multi-Stage Rapid Drawdown	1.40	-
	During Construction	1.14	-
Section D-D'	End of Construction	2.54	1.98
	Steady-State Seepage @ OHWE	1.69	1.29
	Steady-State Seepage @ DFE	1.83	1.26
	Multi-Stage Rapid Drawdown	1.66	-
	During Construction	1.16	-

Notes: DFE = Design Flood Elevation, OHWE = Ordinary High Water Elevation

Based on the results of our circular slope stability analyses, we conclude that the proposed modifications to the levee, including flood/retaining walls, meet or exceed minimum acceptable USACE criteria. EM

1110-2-1913 recommends minimum factors of safety of: End of Construction = 1.3, Long-term Steady State Seepage = 1.4, and Sudden/Rapid Drawdown = 1.1. Our analyses indicate that the updated models, with the revised/final retaining wall geometries, result in improved safety factors for the levee embankment under static and seismic loading conditions.

***Slope Stability Analyses: Critical Noncircular Slip Surfaces***

**USACE Comment:**

*“Slope stability analyses of design conditions relies on circular slip surfaces. The CTB and soil-cement foundation elements provide zones of relatively strong material that contribute to improved slope stability in the calculations. However, the rectangular foundation fill zones are not continuous and invite irregular slip surfaces. Additional analyses are needed to confirm that non-circular surfaces are not the limiting slope stability condition.”*

**GNN Response:**

Due to the complicated geometry of the design flood/retaining wall sections, along with presence of concrete wall elements modeled with infinite strength, selected slopes were analyzed using critical noncircular slip surfaces. As discussed in Section 4-1 & 4-2 of EM 1110-2-1902, careful engineering judgment was exercised to ensure that critical slip surfaces have been located, along with multiple searches completed to identify global minimum factors of safety using numerous trials. Search parameters for composite failure surfaces extending through relatively weaker foundation stratum were selected to result in acceptably refined locations for the most critical slope surfaces.

A summary of the safety factors resulting from non-circular slope stability analyses using the Spencer’s Method for selected design sections is presented in the table below:

**Table 3: Summary of Non-Circular Slope Stability Analysis using Spencer’s Method**

<b>Slope Analyzed</b>	<b>Design Condition</b>	<b>Factor of Safety (Static)</b>	<b>Factor of Safety (Seismic)</b>
Section A-A’	End of Construction	2.31	1.87
	Steady State Seepage @ OHWE	1.40	1.06
	Steady State Seepage @ DFE	1.64	1.10
	Multi-Stage Rapid Drawdown	1.27	-
Section C-C’	End of Construction	2.21	1.81
	Steady State Seepage @ OHWE	1.54	1.21
	Steady State Seepage @ DFE	1.58	1.14
	Multi-Stage Rapid Drawdown	1.47	-

Based on the results of our non-circular slope stability analyses, we conclude that the proposed modifications to the levee, including flood/retaining walls, meet or exceed minimum acceptable criteria as presented in EM 1110-2-1913.

### *Settlement Analysis*

#### USACE Comment:

*“Differential Settlements - The layer of soft materials is considerably thicker than the depth of foundation overexcavation. Is the Consultant convinced that the recommended foundation improvements will prevent differential settlements where the walls transition onto the soft silt? Are subsurface stresses applied by the treated foundation soils and wall loads less than existing consolidation stresses? This should be documented in the report.”*

#### GNN Response:

Settlement analyses were performed to evaluate wall performance under given design loads in support of a final design of the proposed levee flood/retaining walls. Based on information collected during the geotechnical site investigation, the subsurface conditions from boring B-2 should be considered the critical condition for settlement analyses. The foundation soils generally consist of silty sand/sandy silt, silty gravel, and silt in a sequence below the upper embankment fill. The wall heights and footing bottom elevations vary along the proposed wall, as shown in Sheets T3.1 and T3.2 provided by MacKay Sposito. For this settlement analysis, bottom elevation of the wall footing at 371 feet was selected based on the sections shown in Sheet T3.2 from MacKay Sposito. The settlement analyses were completed for four different wall heights including 4, 6, 8, and 10 feet. The settlement analyses assumed groundwater at approximately 369 feet based on data from the geotechnical site investigation.

Immediate settlement for coarse-grained soils and primary consolidation settlement for fine-grained soils were evaluated for static loads, as presented in EM1110-1-1904 *Settlement Analysis*. However, it is anticipated that secondary compression settlements will be insignificant due to a relatively thin fine-grained soil layer underlain by highly permeable gravelly material and a hard silty soil with non- to low-plasticity encountered at a greater depth. The Schmertmann approach was employed to estimate the immediate (elastic) settlement, while the primary consolidation settlement was estimated using ultimate 1-D consolidation theory. Induced stresses beneath the retaining wall strip footings were calculated based on Boussinesq's theory.

Elastic modulus of the coarse-grained foundation soils and compressibility of the fine-grained soils need to be defined for estimates of the immediate and consolidation settlements, respectively. These parameters of the foundation materials were estimated based on published literatures and experience with similar materials, as well as EM 1110-1-1904. The soil compressibility is defined by  $C_c/(1+e_0)$  for normally consolidated soils, where  $C_c$  and  $e_0$  are the compression index and initial void ratio, respectively.

The elastic moduli of each material for the analyses are summarized in Table 4, and the compressibility parameters in Table 5 below:

**Table 4: Elastic Modulus of Foundation Materials**

Material	Elastic Modulus, ksf
Very loose to loose Silty Sand	98
Loose Silty Sand	110
Very dense Gravel with silt and sand	600
Cement-treated Aggregate	1,500
Cement Stabilized Soil	1,000

**Table 5: Compressibility of Foundation Materials**

Material	Compressibility, $C_c/(1+e_0)$
Very soft to soft Silt	0.25
Very stiff Silt	0.10
Hard Silt	0.05

The total settlement at the foundation grade was estimated to be approximately 1.5 inches for a 4-foot high wall, 0.8 inches for a 6-foot wall, 1.2 inches for 8-foot wall, and 1.5 inches for 10-foot wall. Table 6 summarizes the results of the settlement analyses for each of the proposed levee flood/retaining wall sections. The settlement calculation sheets are also provided in Appendix IV.

**Table 6: Total Settlement Estimate for Flood/Retaining Walls**

Exposed Wall Height (feet)	Estimated Settlement (inches)
4	1.5
6	0.8
8	1.2
10	1.5

These results indicate that placement of cement stabilized soil beneath retaining walls greater than 4 feet yield reduced settlements. Differential settlements were calculated based on the ultimate settlement estimates in Table 6. A maximum differential settlement of approximately 0.7 inches was calculated between 4 and 6 foot tall walls. Additionally, the differential settlement can be expressed by angular distortion, which is defined by a ratio of differential settlement to distance between two points considered. When considering approximately 25 feet in representative distance between two wall segments, the maximum angular distortion was calculated to be 1/430.

Section 2-2 of EM 1110-1-1904 recommends that the maximum allowable total settlement should not exceed 2 inches for most facilities. Additionally, framed structures can tolerate total settlement up to 4 inches, as presented in Table 2-1 of the EM 1110-1-1904. For differential settlement, Section 2-3 of the EM 1110-1-1904 suggests *differential movements between monoliths of dams should not usually exceed 2 inches, otherwise leakage may become a problem*. Additionally, Table 2-2 of EM 1110-1-1904 recommends the maximum allowable angular distortion be 1/500 for steel and concrete frame structures. The USACE Engineer Manual, Retaining and Flood Walls, EM 1110-2-2502 (USACE, 1989), recommends the maximum allowable angular distortion ranging from 0.002 to 0.003 for reinforced concrete retaining walls that can be tolerable with no cracking.

Therefore, we conclude that evaluation of the settlements for the proposed levee flood/retaining walls resulted in ultimate settlement of less than 2 inches, differential settlement of less than 1 inch, and maximum angular distortion of 1/430. The proposed flood/retaining wall structures will tolerate settlements of this magnitude.

### ***Seepage Analysis and Risk***

#### **USACE Comments:**

- ✓ *“The West Richland levee system is one of the only levees in the Walla Walla District with a reported sand boil on its land side. It is also one of the only levees in the District with gravel seepage berms. Seepage and seepage related risks are very real issues for this levee system. The reviewer believes the proposed pedestrian path improvements are upstream of where the seepage problems along the levee will affect risks for landside property owners. However, the Geotechnical Report does not include any seepage analyses or discussions. The consultant needs to confirm and*

*explain that the proposed improvements do not increase the risk of seepage or introduce the need for interior drainage - especially at the house located adjacent to the levee, nearest to the site.”*

- ✓ *“The reviewer is skeptical of the assertion that, "underseepage problems will be minor" along foundation excavations that extend below the groundwater surface in soft/loose silt.”*

GNN Response:

Two-dimensional finite element seepage analyses was performed to support our engineering design of the proposed levee flood/retaining walls. The seepage analyses under a steady-state seepage condition were completed to assess a phreatic level, pore pressure condition, potential underseepage flow rate, and exit hydraulic gradient through the flood/retaining system. The analyses was based on the levee design criteria, most updated design configurations and site conditions obtained from our geotechnical site investigation.

As shown in Sheet T3.2 from MacKay Sposito, two sections, Sections A and B, were selected for analyses since these were considered critical for underseepage flow. Subsurface soil conditions along Section A were based on boring B-1, and along Section B based on boring B-2. Below the embankment, the base boundary elevation of the foundation was modeled at 345 feet below a levee crest elevation of 380 feet to get a sense of the flow regime under the embankment. Each of the cross-section models are illustrated in Appendix III.

Two-dimensional seepage analyses were conducted using the finite element computer program SLIDE Version 6.037 (Rocscience Inc, 2015), which can be used to model the movement of pore water and its pressure distribution within porous materials such as soil and fractured rock. The program allows the user to develop a model by generating a finite element mesh, assigning material properties for different zones and specifying boundary conditions. The SLIDE program can model both saturated and unsaturated flow as well as transient and steady-state conditions. The program can generate plots illustrating the flow regime and the distribution of any of the listed parameters such as total head, pore pressure, or hydraulic gradient.

The embankment was modeled assuming isotropic hydraulic conductivities for all materials. The saturated hydraulic conductivities of the foundation materials as well as the construction materials including the berm fill, compacted backfill, cantilever concrete wall, cement-treated aggregate, and



cement stabilized soil were estimated based on prior experience with similar materials as well as USACE engineering and design manuals including Figure 2-5 of EM 1110-2-1901 and Figure 3-5(b) of EM 1110-2-1913.

The saturated hydraulic conductivity of each material for the analyses are summarized in Table 7 below:

**Table 7: Hydraulic Properties for Flooding Wall Seepage Analyses**

<b>Material</b>	<b>Saturated Hydraulic Conductivity (feet/sec)</b>
Concrete Retaining Wall	$1.0 \times 10^{-12}$
Berm Fill	$3.0 \times 10^{-4}$
Sandy Gravel	$1.0 \times 10^{-2}$
Silt with Sand / Sandy Silt / Silty Sand	$2.0 \times 10^{-5}$
Silty Sandy Gravel	$5.0 \times 10^{-4}$
Silt	$1.0 \times 10^{-6}$
Cement-treated Aggregate	$1.0 \times 10^{-3}$
Cement Stabilized Soil	$5.0 \times 10^{-4}$
Compacted Backfill	$3.0 \times 10^{-4}$

Saturated/unsaturated models were used to represent the hydraulic properties of the materials comprising the embankment. Unsaturated hydraulic conductivity functions were estimated by using common correlations for similar material provided within the program.

In general, one of two fundamental boundary conditions may be specified in a finite element seepage analysis: conditions of head (H) or flux (Q). For the cases analyzed, the following boundary conditions were specified to represent anticipated conditions at the site.

- **Total Head Boundary** - Total head conditions were applied within the Yakima River, upstream of the embankment, to simulate a design flood level. For a flood event condition, a total head of 375.9 feet corresponding to the design flood level was specified on the upstream ground surface, exposed face of the flood walls, and proposed pathway. Additionally, a total head of 375 feet was specified along the landside prevailing grade of the levee, with a ground surface elevation of approximately 375 feet.

- Unknown Seepage Face (Q=0 or Zero Pressure) - The crest and downstream face of the embankment were modeled as a potential seepage boundary.
- No Flow - The base of the foundation was modeled as no flow.

The seepage analysis input data (including the geometry and boundary conditions) for each section are illustrated in Appendix III. Steady-state seepage analysis results, including phreatic surface, total head contours, exit hydraulic gradient contours, flow vectors, and potential seepage quantity, are also presented in Appendix III.

In general, the seepage results for both sections exhibited flow through the embankment foundation, indicating the majority of head loss occurred within the foundation zones below the embankment. The contour lines are not smooth due to numerical instability of the computer program itself, but the general flow regime appears reasonable. Additionally, estimated phreatic level was located at approximately 375 feet, which is coincidental with the existing surface grade of the landside. Potential seepage quantities in the vicinity of the downstream toe of the levee embankment were estimated to range between approximately 2.01 and 2.89 cubic feet per day. Additionally, computed exit hydraulic gradient was less than 0.1. The USACE Technical Letter ETL 1110-2-569 *Design Guidance for Levee Underseepage* (USACE, 2005) recommends a maximum acceptable exit hydraulic gradient of 0.5 at the embankment toe. As outlined in the Design Memorandum for the Yakima River levee project in West Richland (Walla Walla District Corps of Engineers, Columbia River and Tributaries, Yakima River, Vicinity of West Richland, General Design Memorandum (Unclassified) in October 1958), USACE states a maximum design underseepage of 3 cubic feet per day for this levee. Therefore, the seepage results show that there would be no adverse underseepage potential for the proposed levee flood/retaining wall structures since both computed exit gradient and underseepage quantity meet the design requirements.

### ***Construction Concerns: Sloped Excavation***

#### **USACE Comments:**

- ✓ *“The Consultant recommends use of shoring or sloped excavation sides without a discussion of the cross slope the Contractor will be benched into.”*
- ✓ *“If shoring is used, that's a cost, but it minimizes excavations, cement, and import, and other costs.”*

- ✓ *“If foundation excavations are sloped, that substantially increases the volume of soil to move. It also introduces interference where excavations low on the slope project up under the walls higher on the slope.”*

GNN Response:

While the contractor may have the option of using either shoring or sloping back-cuts for deeper excavations to perform the recommended subgrade improvement, we suggest that the sloping option will be the preferred method as it will eliminate the need for driving of vertical shoring elements into the levee. If the shoring option is elected, the contractor shall be responsible for design of the shoring system along with submittal of a shoring plan for appropriate review.

For the sloping option, placement and compaction of engineered fill soils for rebuilding of the levee embankment shall be completed in accordance with the recommendations of the referenced geotechnical report. Fill soils should be keyed and benched into the exposed existing levee embankment materials. This will help ensure a good bond between the existing soils and new fill, and to eliminate a plane of weakness at the interface. It is recommended that the GER, or their representatives, be present during the fill construction to observe compliance with the above recommendations.

***Construction Concerns: Dewatering and Dewatered Excavation Compaction***

USACE Comments:

- ✓ *“Dewatering - The Report indicates that temporary dewatering “during deeper excavations will likely be required.” It goes on to require dewatering to 2 feet below the bottom of the foundation excavation. Apparently, this is recommendation is based on the page 4 (of the Geotechnical Report)...”*
- ✓ *“Compaction in Dewatered Excavations - Considerable care will be needed to achieve compaction of treated soils in foundation overexcavations where dewatering is needed to keep groundwater below the excavation. Wet subgrade soils will be vulnerable to disturbance while compaction effort is applied.”*
- ✓ *“The recommended excavations, dewatering, and subgrade preparation invite construction risks with cost and schedule implications: (1) water volumes may be large, requiring specialized*

*equipment and disposal; and (2) aerating and compacting the dewatered zone of silty soils in the bottom of the excavation might be impracticable.”*

GNN Response:

For clarification, it shall be understood that the comment within the geotechnical report relating to “...water seeping very slowly into exploratory borings...” refers to information provided by USACE in the referenced Design Memorandum (1958).

We generally agree with the reviewer’s comment regarding care needed for preparation of the dewatered subgrade. Placement and compaction of the exposed subgrade and engineered fill soils shall be completed in accordance with the recommendations of the referenced geotechnical report.

As previously suggested in our referenced geotechnical design report, we recommend that construction activities be planned during late summer (July) and early fall (October) months when river levels are the lowest. We recommend that the design of the dewatering system be completed per TM 5-818-5.

***Construction Concerns: Cement Treated Aggregate & Cement Stabilized Soils***

USACE Comments:

- ✓ *“Cement Treatment - The Report includes recommendations for cement stabilization of subgrade soils, as well as CTB material made with cement and imported crushed rock. Does the Consultant have experience successfully adding and mixing cement on 8% grades? ...in foundation excavations extending diagonally across slopes? It appears the depth of treatment achievable by equipment would control how deep the excavations need to be. This should be considered in the slope stability evaluations for During Construction conditions.”*
- ✓ *“The Consultant is solving a variety of geotechnical problems. They rely on local experience and knowledge of construction practices. Several details of the Consultant's recommendations appear unconventional to the reviewer.”*
- ✓ *“Perhaps the CTB is used because flowable concrete is difficult to place on 8% slopes.”*
- ✓ *“Not at all certain how cement will be mixed with the soil after the fashion of the referenced "Soil Stabilization for Pavements.”*

- ✓ *“Not certain this approach is practicable where soil-cement mixes are placed in areas requiring dewatering.”*
- ✓ *“Again, not at all certain how cement will be mixed with the gravel after the fashion of the referenced "Soil Stabilization for Pavements." It seems likely the mixed product would be delivered to the site.”*

GNN Response:

Cement treated soils and aggregates are a common solution for improvement of poor soil subgrade conditions for a number of geotechnical applications. As outlined in EM 1110-2-1913 Appendix G, “soil cement” is defined by the American Concrete Institute as a mixture of soil and the measured amounts of portland cement and water compacted to a high density. Cement treated materials are produced by blending, compacting, and curing a mixture of soil and/or aggregate with portland cement and water to form a hardened with specific engineering properties.

Cement Treated Base (CTB) is a common variant of cement treated aggregate. The referenced geotechnical report provides a detailed narrative regarding the recommendations for preparation and placement of cement treated soils and cement treated base materials. Various aspects of the construction process utilizing cement treated materials, including proportioning, mixing, blending, processing, placement, compaction, and quality control shall be performed in accordance with the geotechnical report and Appendix G of EM 1110-2-1913.

For clarification, all recommendations for foundation subgrade improvements assume that the retaining wall foundations will be stepped horizontally to accommodate grade changes along the proposed alignments. All engineered fill, including compacted soils, cement treated soils, and cement treated base will be placed in horizontal lifts on prepared benches.

***Construction Concerns: Geotextile Separation Fabric***

USACE Comments:

- ✓ *“The Consultant recommends placement of a geotextile filter fabric on compacted, cement-treated subgrade soils, prior to backfilling the foundation overexcavation trench with CTB material”*

- ✓ *“The fabric is excellent for separation, but what water movement needs to be filtered to keep fine soil particles in place?”*
- ✓ *“The fabric is effective at reinforcement, though it fails at very high strain, and woven fabrics of similar cost can be both much stiffer, and much stronger. What reinforcement function does it serve on top of the compacted soil-cement subgrade?”*

GNN Response:

The footing of the proposed retaining/flood walls will be underlain by cement treated soil/crushed rock with a minimum thickness of 2 feet. The recommended Mirafi 600X geotextile fabric will be installed on the compacted native subgrade prior to placement of the cement treated materials. The geotextile fabric is intended to provide initial stability and confinement/separation between the prepared excavation and the cement treated materials.

*Adherence to USACE Criteria*

USACE Comments:

- ✓ *“The Geotechnical Engineer indicates....However, based on the low factors of safety reported from the slope stability analyses, it is not clear that the Consultant is convinced the structures can be constructed in accordance with USACE criteria. The design should be improved and sufficient analyses completed to ensure USACE criteria will be met.”*
- ✓ *“The Geotechnical Report does not conclude that the design (and construction) of the proposed improvements meet USAGE requirements per applicable references.”*

GNN Response:

***Based on the data obtained from our site-specific exploration and evaluation of the existing levee conditions at the project site, combined with appropriate design and engineering of the proposed modifications to the levee to include new retaining walls, it is our professional opinion that the proposed Yakima River Gateway Project improvements will meet or exceed all pertinent and applicable US Army Corps of Engineers criteria and requirement for flood control levee design and construction.***

We believe that this letter clearly and fully addresses USACE's expressed concerns, request for clarifications, and additional analyses for the proposed levee modifications relating to the Yakima River Gateway Project.

If you have any further questions or concern, please contact us at 509-248-9798.

Respectfully submitted,



M. Yousuf Memon, EIT  
Staff Engineer



Karl A. Harmon, L.E.G., P.E.  
Senior Geologist/Engineer



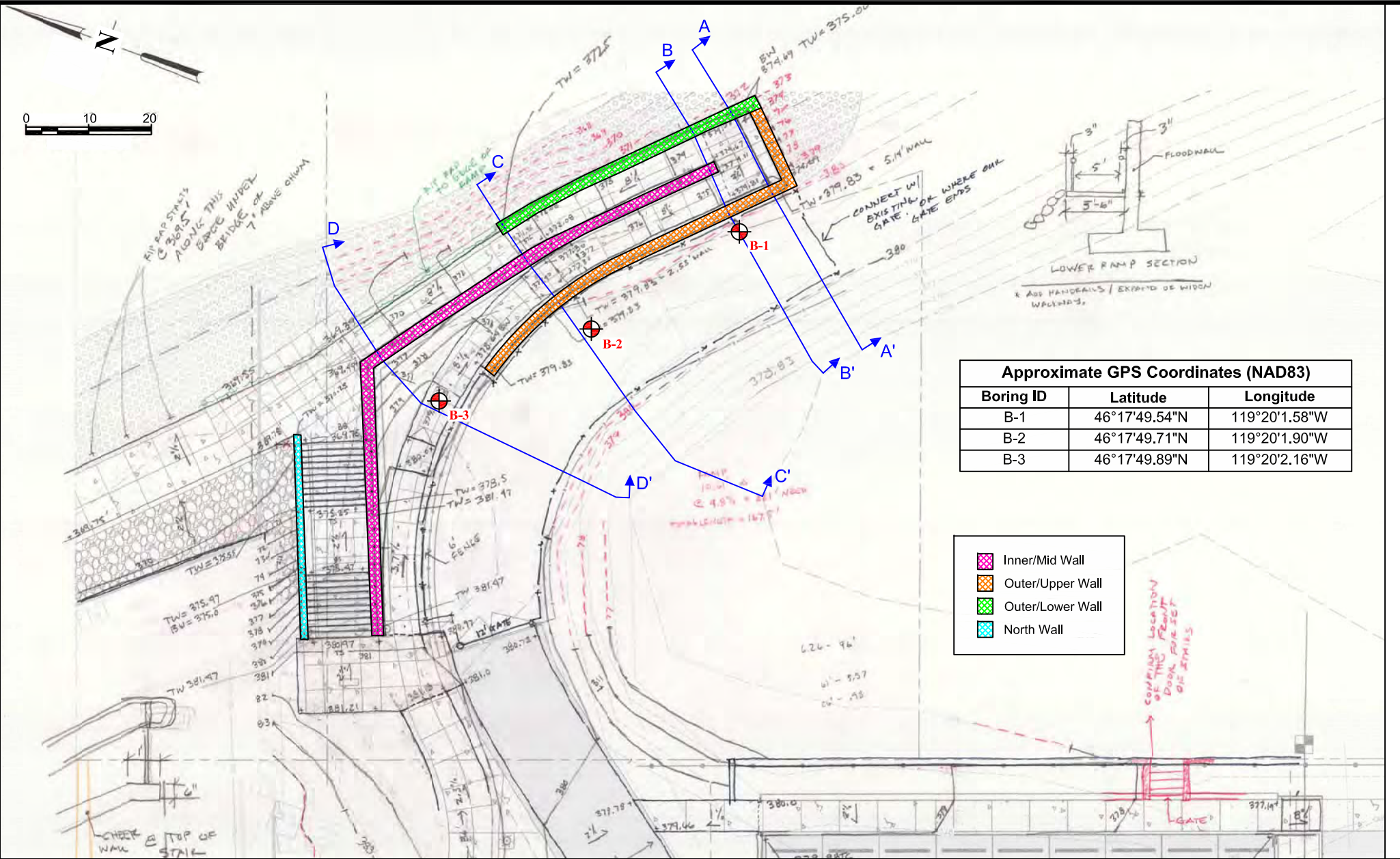
Expires 08/02/2017

Attachments:

- Appendix I - Circular Slope Stability Analyses
- Appendix II - Non-Circular Slope Stability Analyses
- Appendix III - Finite Element Seepage Analyses
- Appendix IV - Settlement Analysis
- Appendix V - USGS PHS Deaggregation Output
- Appendix VI - References

*Appendix I*  
*Circular Slope Stability Analyses*





Approximate GPS Coordinates (NAD83)		
Boring ID	Latitude	Longitude
B-1	46°17'49.54"N	119°20'1.58"W
B-2	46°17'49.71"N	119°20'1.90"W
B-3	46°17'49.89"N	119°20'2.16"W

Inner/Mid Wall  
 Outer/Upper Wall  
 Outer/Lower Wall  
 North Wall

NOTES: Base plan titled *Grading and Layout Enlargements*, provided 4/13/2015 by MacKay Spósito.

LEGEND: Boring Location Section Line

Northern, Inc.

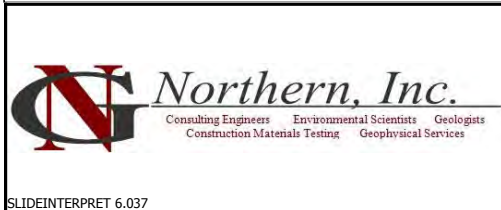
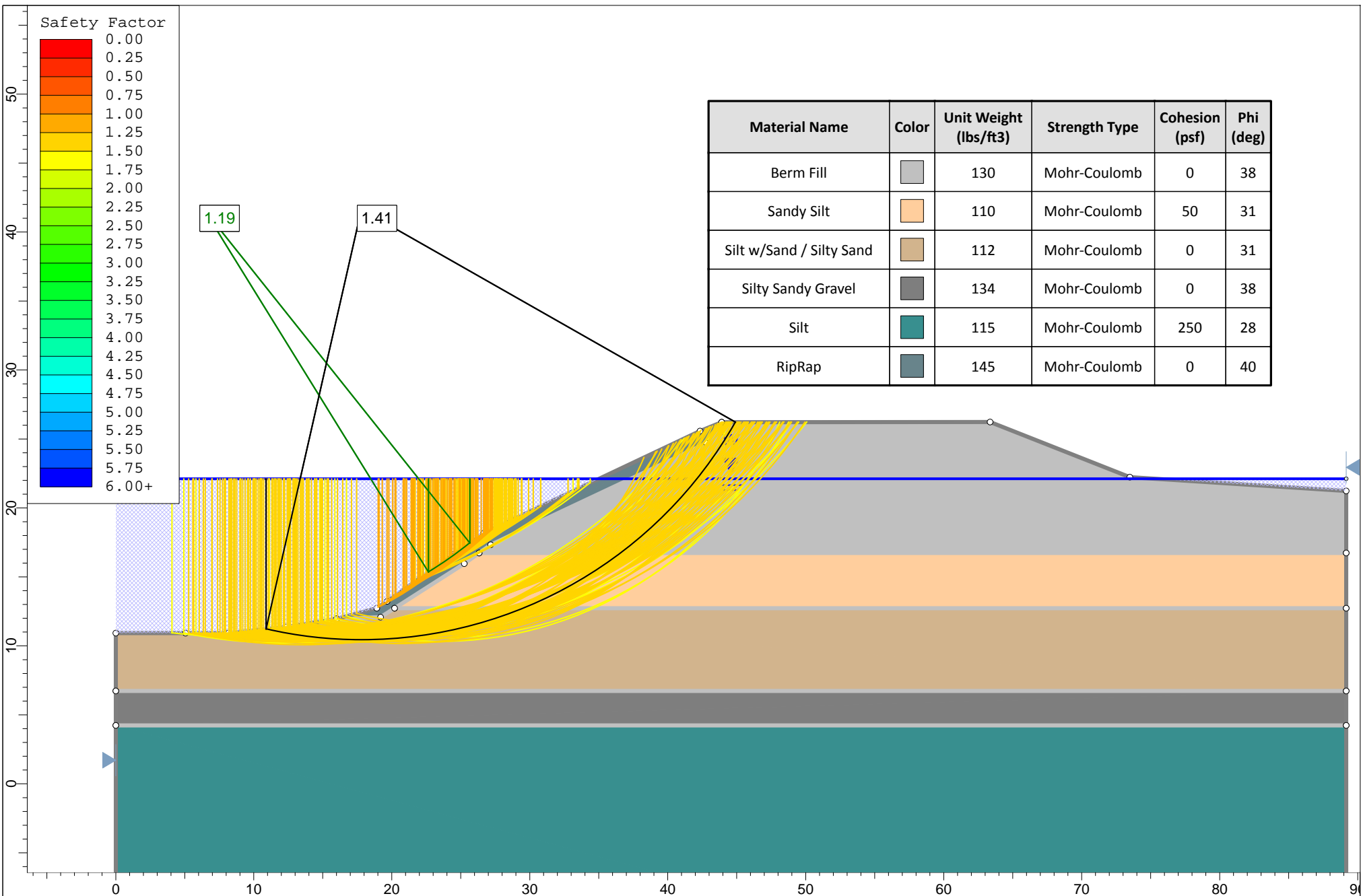
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Construction Materials Testing   Geophysical Services

Job No. 214-542

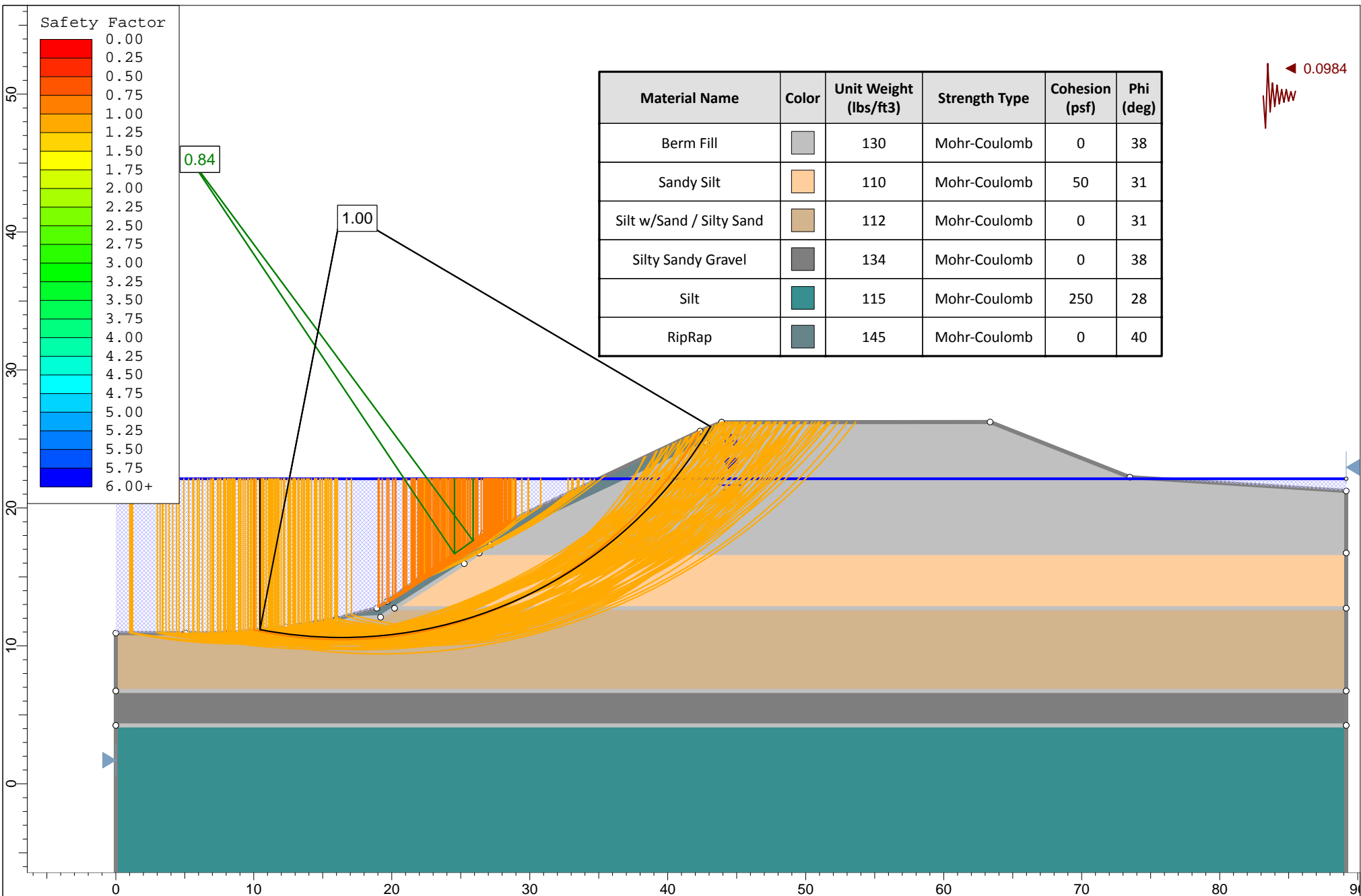

Preliminary Wall Layout Plan

Yakima River Gateway Project  
Yakima River & Highway 224  
West Richland, Benton County, Washington

Date 7/1/2015	Drawn By MYM	Reviewed By KAH	Figure 3
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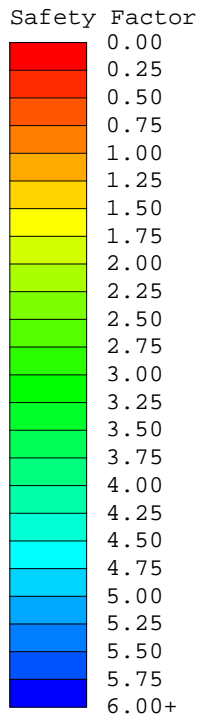
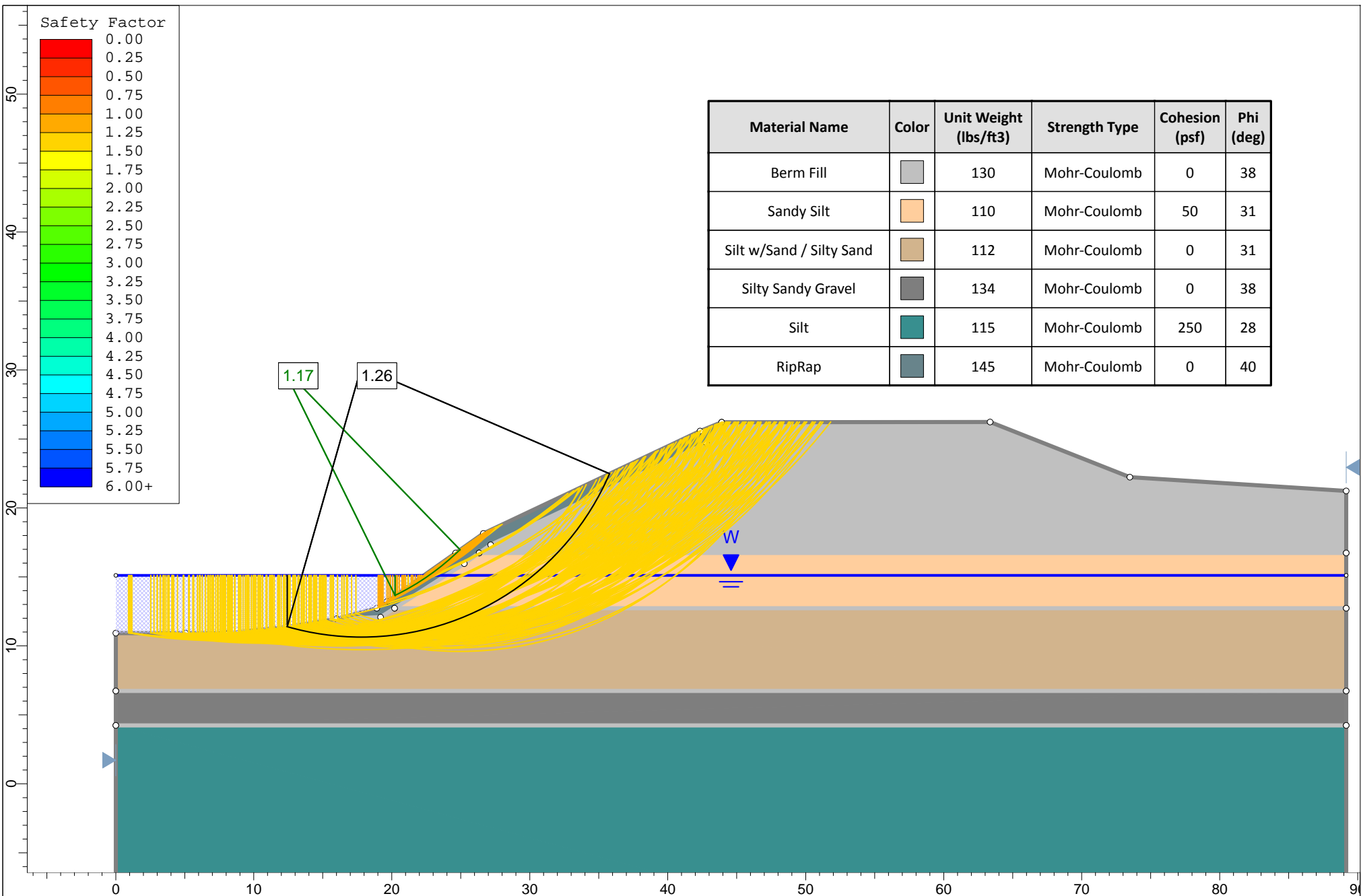


Project		Yakima River Gateway Project	
Analysis Description		Section C-C' - Existing Levee - Steady-State Seepage @ DFE (Static)	
Drawn By	KAH	Scale	1:112
Date		Company	GN Northern, Inc.
		File Name	C-C' - EXISTING - Steady Seepage - DFE.slim





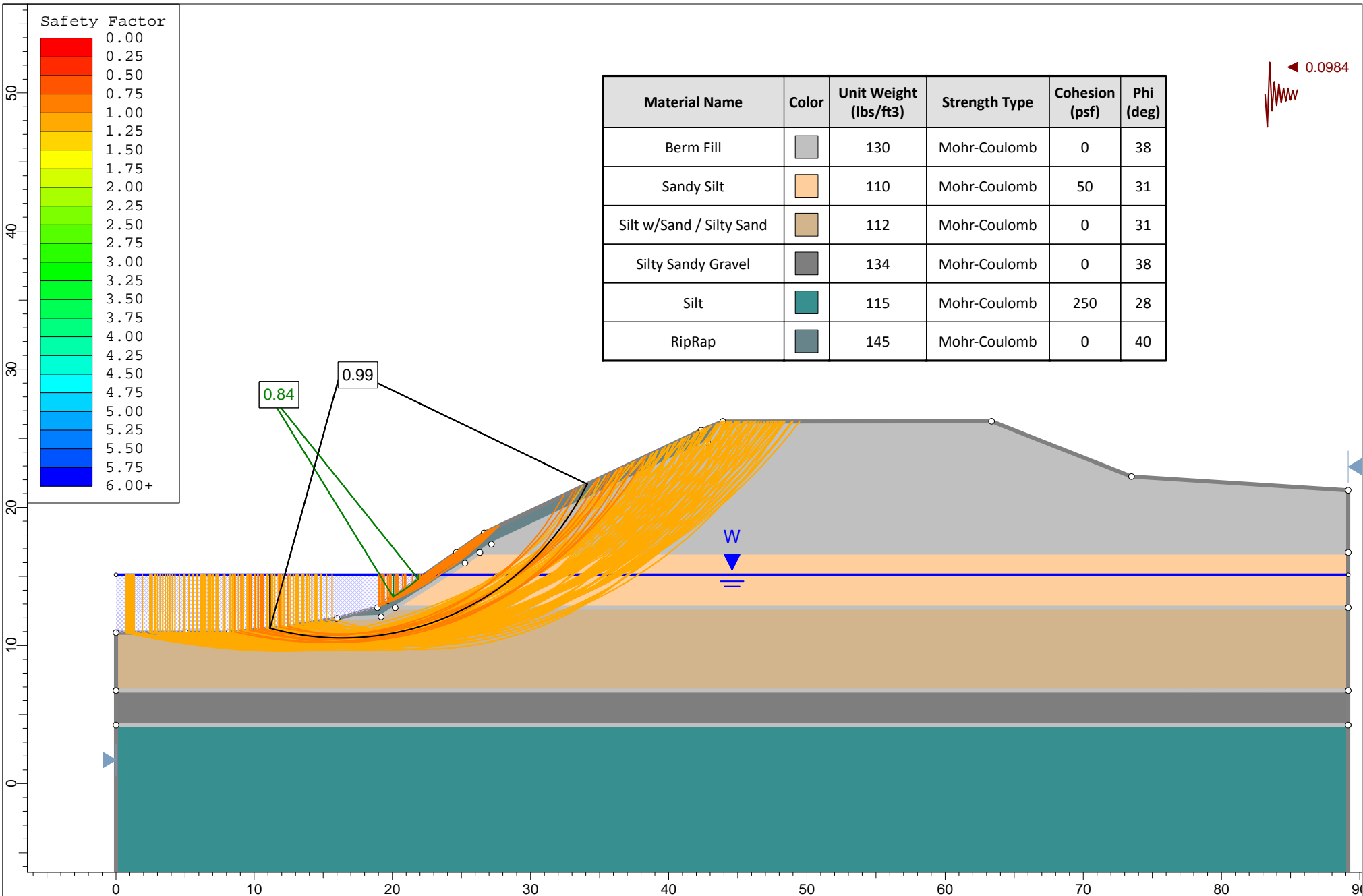
**Northern, Inc.**  
 Consulting Engineers Environmental Scientists Geologists  
 Construction Materials Testing Geophysical Services


Project			Yakima River Gateway Project		
Analysis Description			Section C-C' - Existing Levee - Steady-State Seepage @ DFE (Seismic)		
Drawn By	KAH	Scale	1:112	Company	GN Northern, Inc.
Date		File Name	C-C' - EXISTING - Steady Seepage - DFE (seismic).slim		

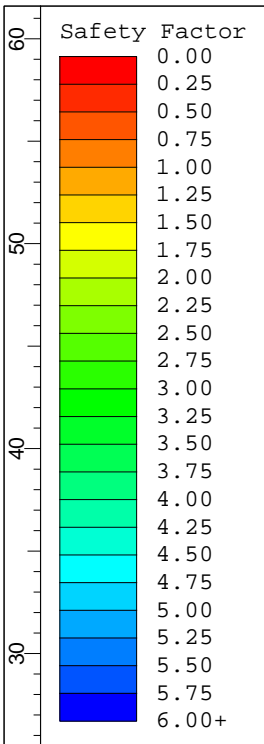


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Berm Fill	Grey	130	Mohr-Coulomb	0	38
Sandy Silt	Orange	110	Mohr-Coulomb	50	31
Silt w/Sand / Silty Sand	Tan	112	Mohr-Coulomb	0	31
Silty Sandy Gravel	Dark Grey	134	Mohr-Coulomb	0	38
Silt	Teal	115	Mohr-Coulomb	250	28
RipRap	Dark Blue	145	Mohr-Coulomb	0	40

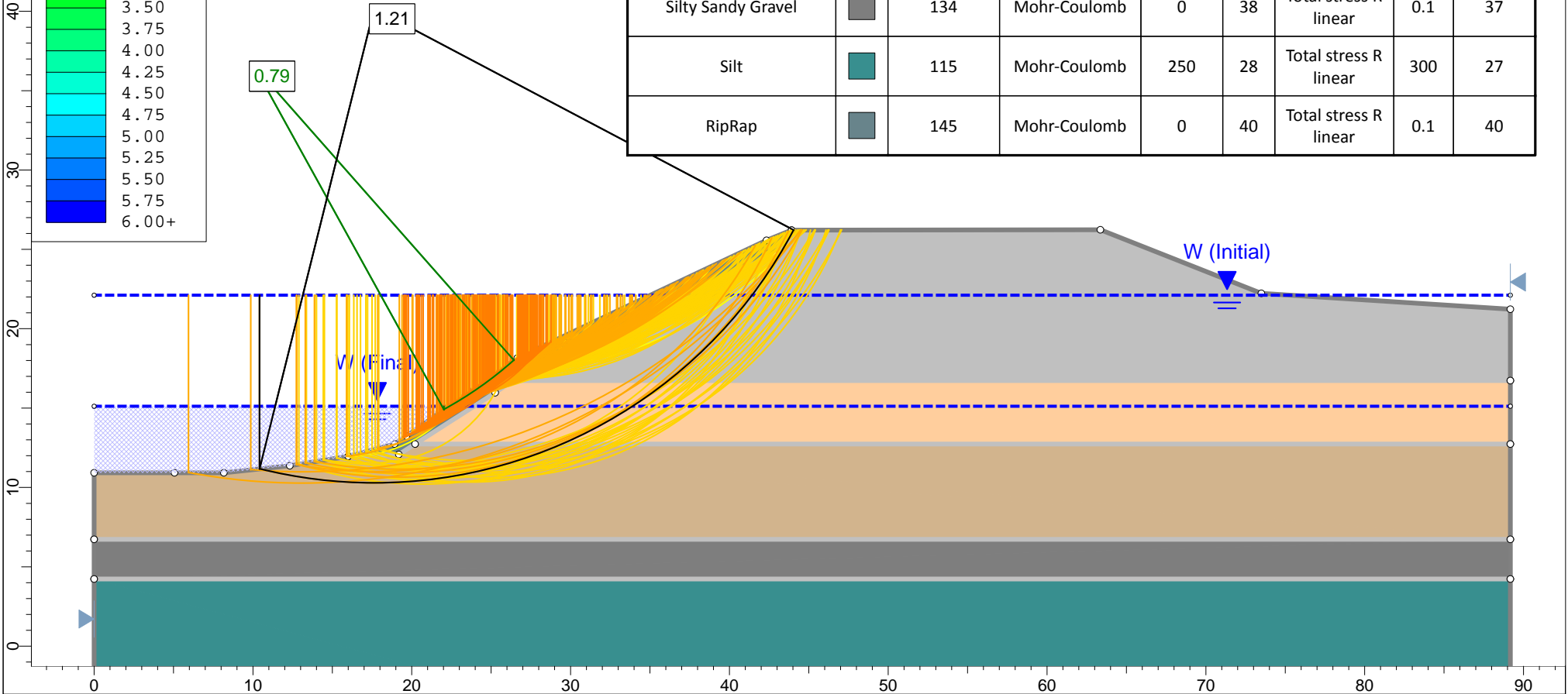
 <p><b>Northern, Inc.</b>  <small>Consulting Engineers Environmental Scientists Geologists          Construction Materials Testing Geophysical Services</small></p>	Project			Yakima River Gateway Project		
	Analysis Description			Section C-C' - Existing Levee - Steady-State Seepage @ OHWE (Static)		
	Drawn By	KAH	Scale	1:112	Company	GN Northern, Inc.
	Date		File Name	C-C' - EXISTING - Steady Seepage - OHWE.slim		
	SLIDEINTERPRET 6.037					



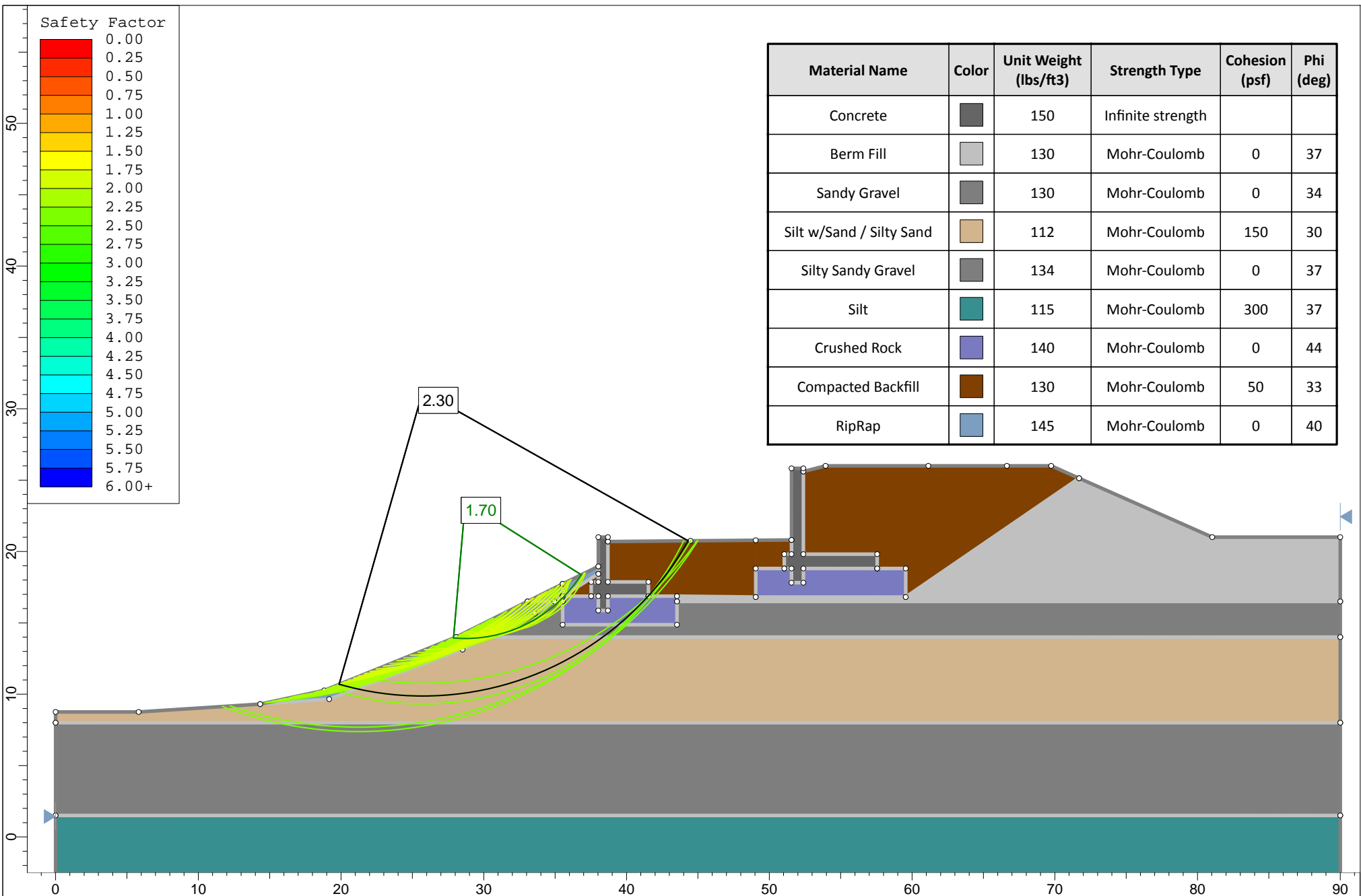

 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project			Yakima River Gateway Project								
	Analysis Description						Section C-C' - Existing Levee - Steady-State Seepage @ OHWE (Seismic)					
	Drawn By			Scale			Company					
	KAH			1:112			GN Northern, Inc.					
Date						File Name						
						C-C' - EXISTING - Steady Seepage - OHWE (seismic).slim						



Material Name	Color	Unit Weight (lbs/ft <sup>3</sup> )	Strength Type	Cohesion (psf)	Phi (deg)	RD Envelope Type	RD Cr (psf)	RD PhiR (deg)
Berm Fill		130	Mohr-Coulomb	0	38	Total stress R linear	0.1	37
Sandy Silt		110	Mohr-Coulomb	50	31	Total stress R linear	200	30
Silt w/Sand / Silty Sand		112	Mohr-Coulomb	0	31	Total stress R linear	150	30
Silty Sandy Gravel		134	Mohr-Coulomb	0	38	Total stress R linear	0.1	37
Silt		115	Mohr-Coulomb	250	28	Total stress R linear	300	27
RipRap		145	Mohr-Coulomb	0	40	Total stress R linear	0.1	40

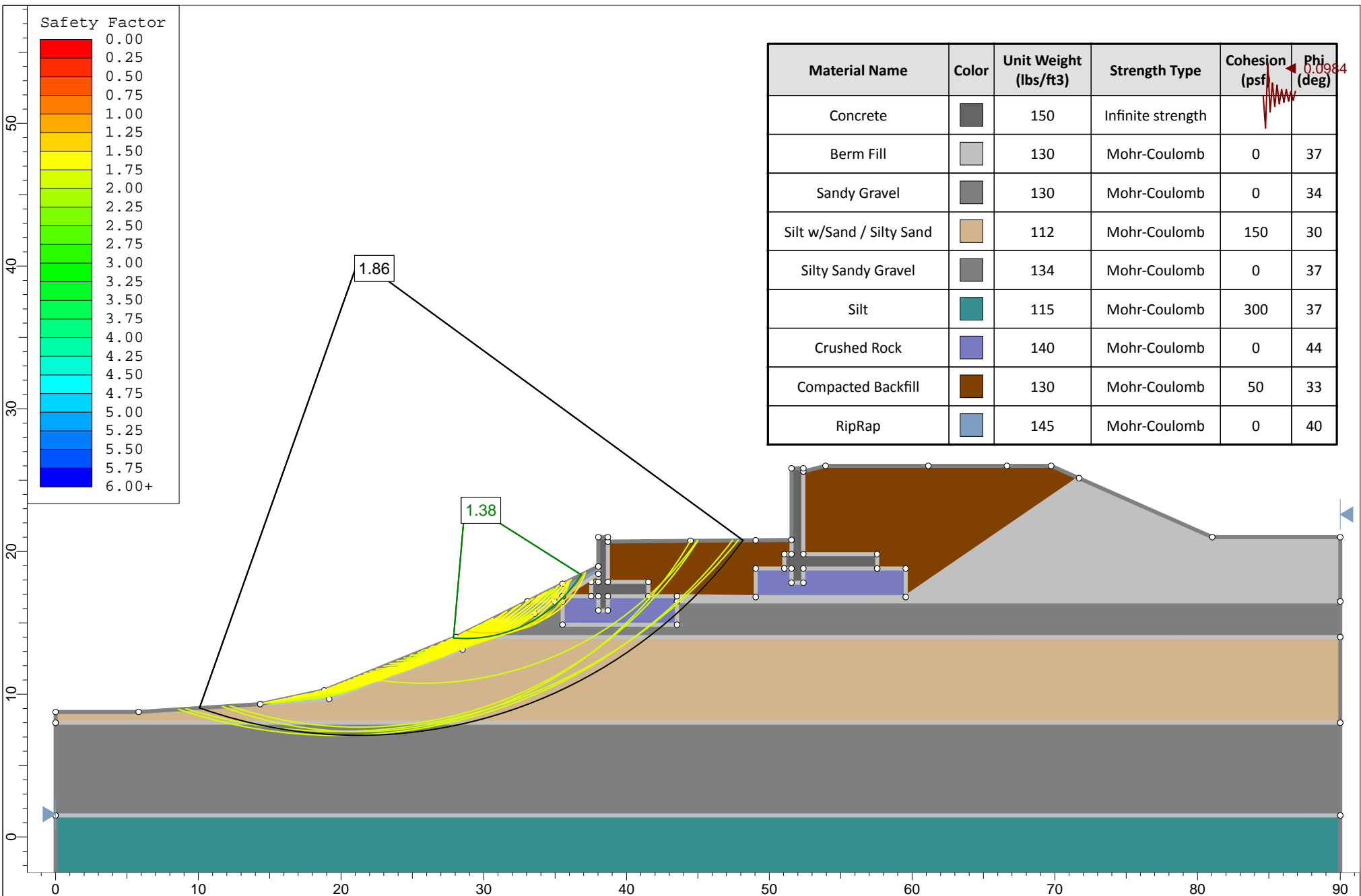


<p><b>Northern, Inc.</b>  <small>Consulting Engineers Environmental Scientists Geologists          Construction Materials Testing Geophysical Services</small></p>	Project			Yakima River Gateway Project		
	Analysis Description			Section C-C' - Existing Levee - Multi-Stage Rapid Drawdown (Static)		
	Drawn By	KAH	Scale	1:112	Company	GN Northern, Inc.
	Date		File Name	C-C' - EXISTING - Rapid Drawdown.slim		

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 Construction Materials Testing Geophysical Services

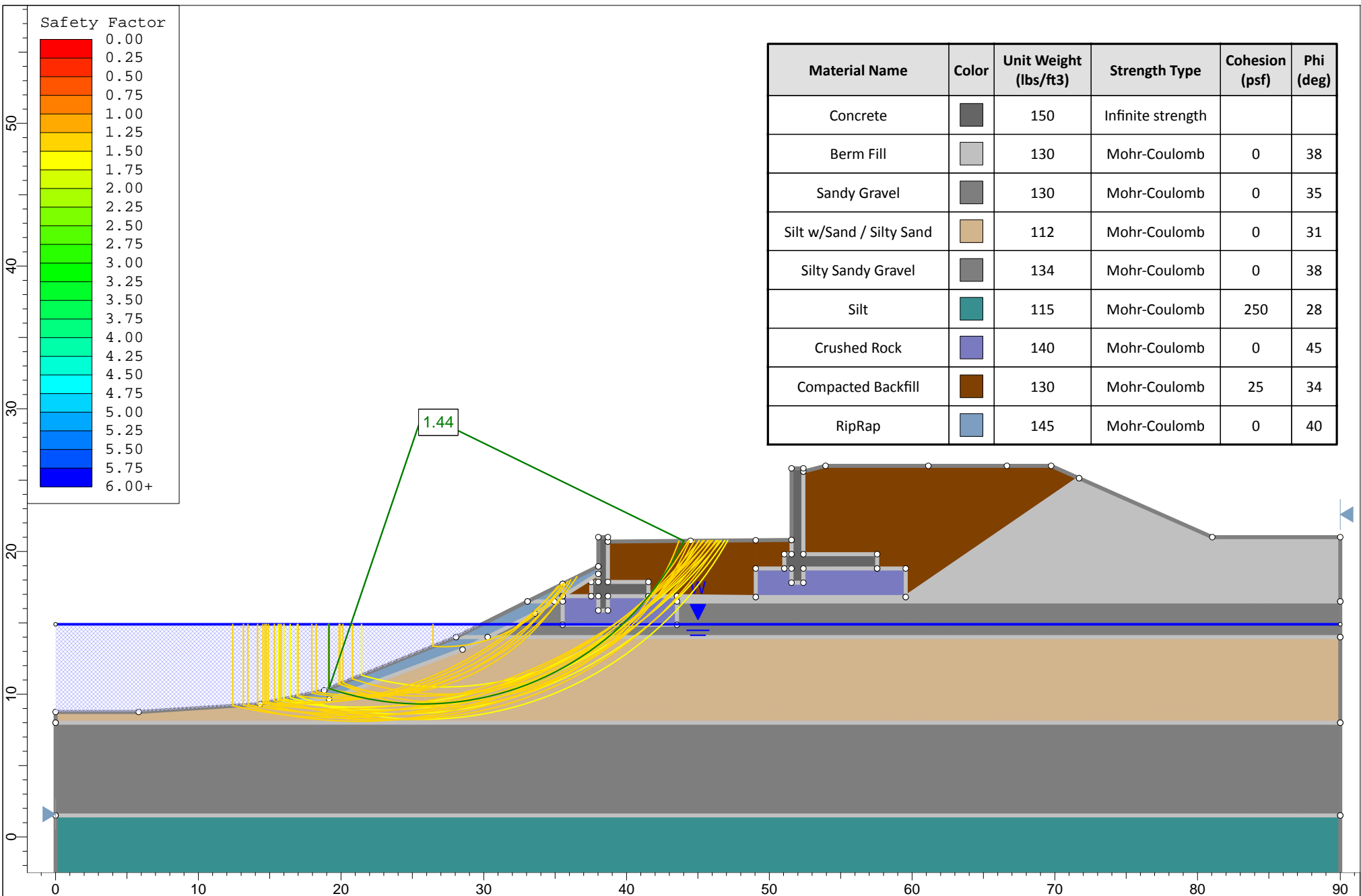
Project		Yakima River Gateway Project	
Analysis Description		Section A-A' - End of Construction (Static)	
Drawn By	KAH	Scale	1:109
		Company	GN Northern, Inc.
Date		File Name	A-A' - WALLS - End of Construction.slim




**Northern, Inc.**  
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 Construction Materials Testing Geophysical Services

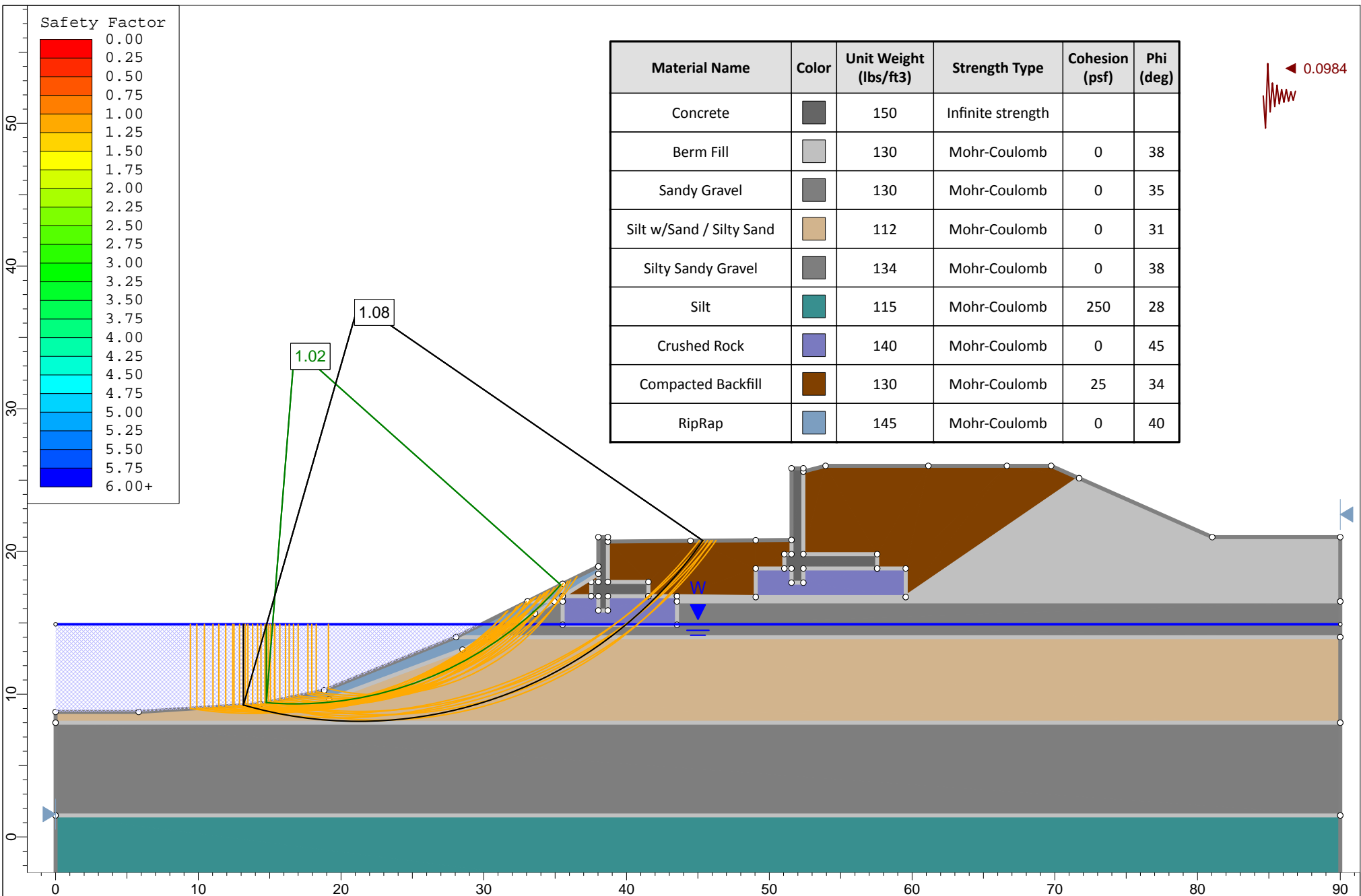

Project			Yakima River Gateway Project		
Analysis Description			Section A-A' - End of Construction (Seismic)		
Drawn By	KAH	Scale	1:109	Company	GN Northern, Inc.
Date		File Name	A-A' - WALLS - End of Construction (seismic).slm		





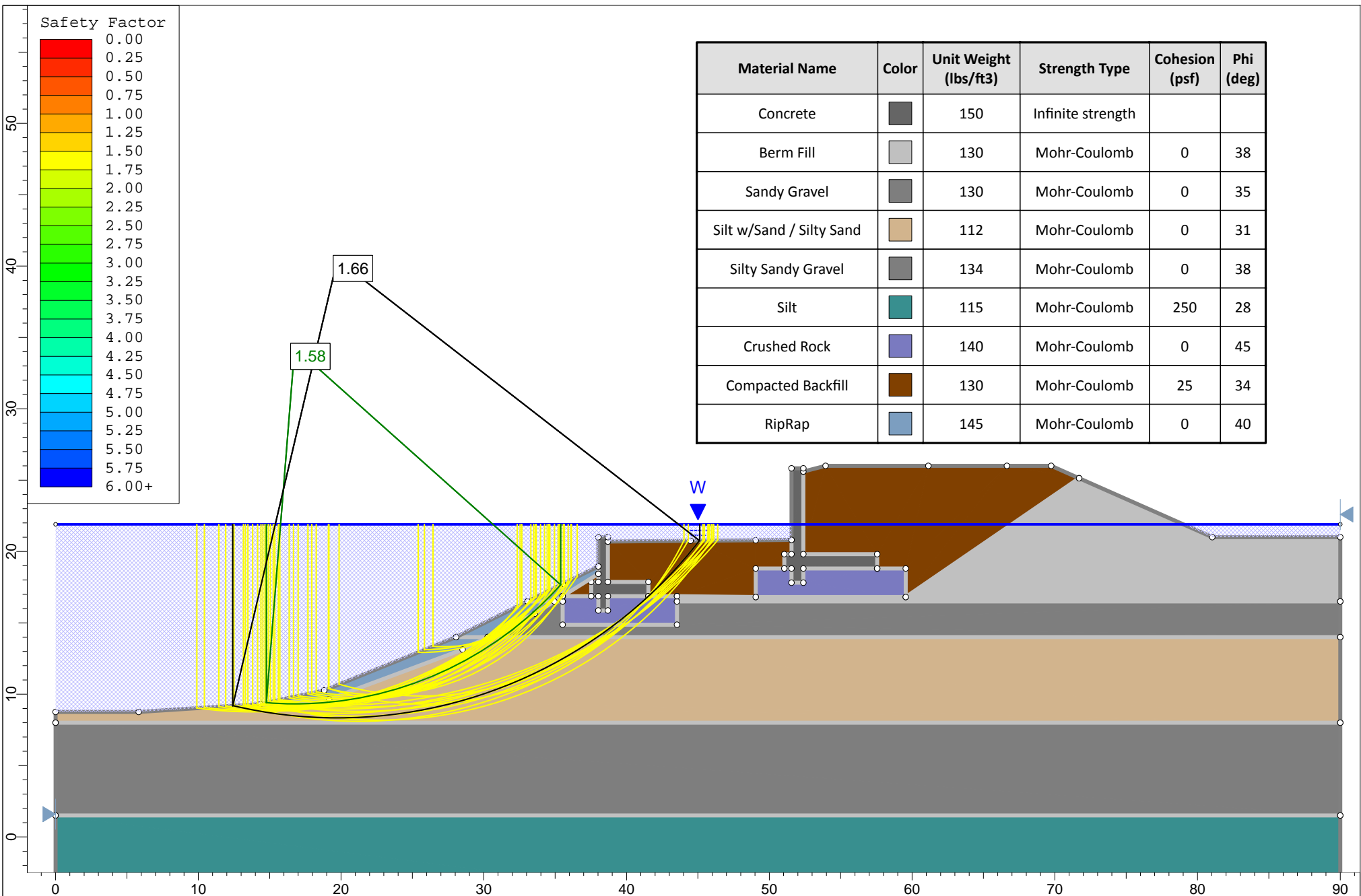
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Concrete	Grey	150	Infinite strength		
Berm Fill	Light Grey	130	Mohr-Coulomb	0	38
Sandy Gravel	Dark Grey	130	Mohr-Coulomb	0	35
Silt w/Sand / Silty Sand	Tan	112	Mohr-Coulomb	0	31
Silty Sandy Gravel	Dark Grey	134	Mohr-Coulomb	0	38
Silt	Teal	115	Mohr-Coulomb	250	28
Crushed Rock	Purple	140	Mohr-Coulomb	0	45
Compacted Backfill	Brown	130	Mohr-Coulomb	25	34
RipRap	Light Blue	145	Mohr-Coulomb	0	40

 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project			Yakima River Gateway Project		
	Analysis Description			Section A-A' - Post Construction - Steady-State Seepage (Static)		
	Drawn By	KAH	Scale	1:109	Company	GN Northern, Inc.
	Date		File Name	A-A' - WALLS - Steady Seepage - OHWE.slim		

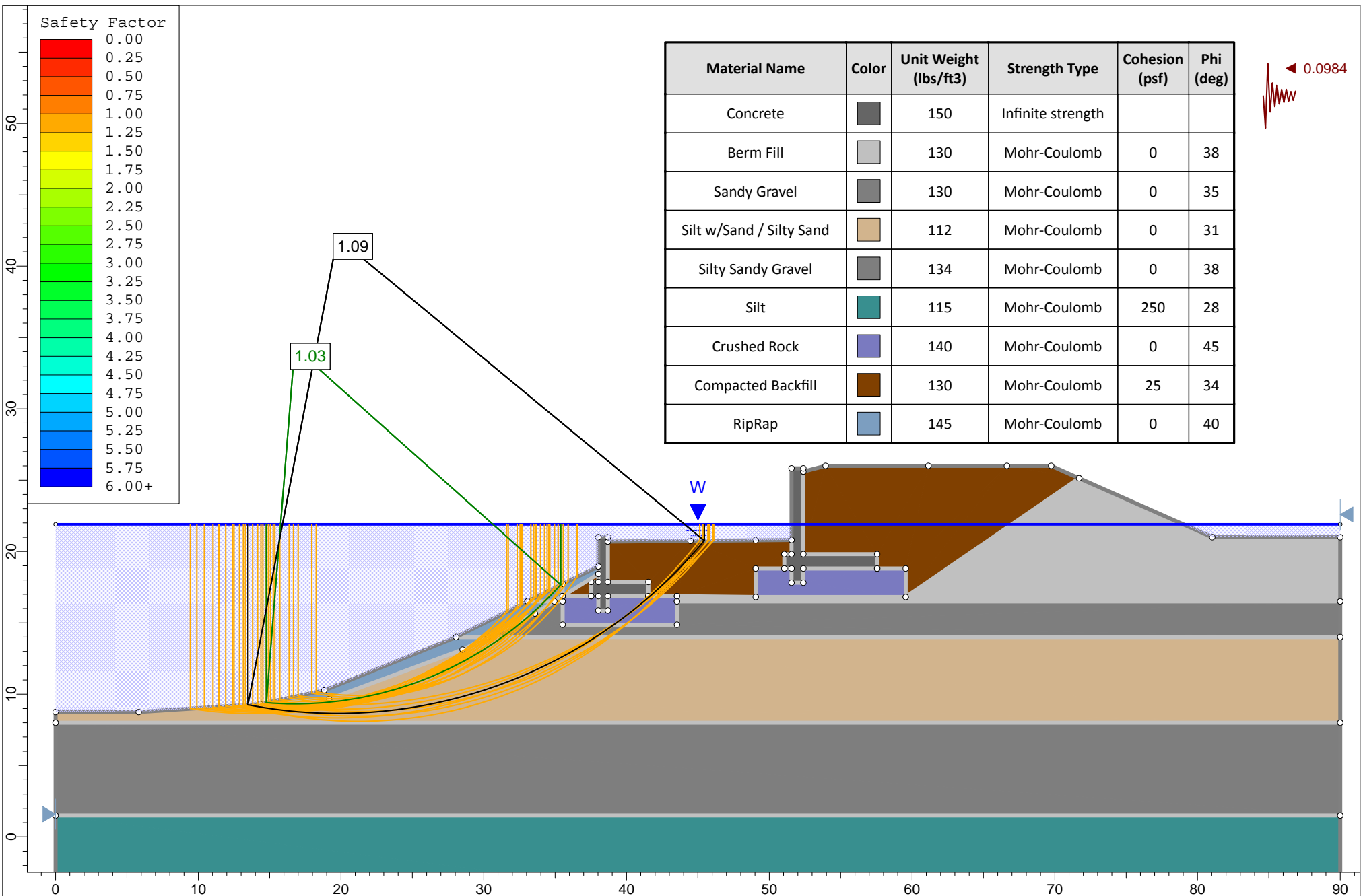
**Northern, Inc.**  
 Consulting Engineers Environmental Scientists Geologists  
 Construction Materials Testing Geophysical Services

Project			Yakima River Gateway Project		
Analysis Description			Section A-A' - Post Construction - Steady-State Seepage (Seismic)		
Drawn By	KAH	Scale	1:109	Company	GN Northern, Inc.
Date		File Name	A-A' - WALLS - Steady Seepage - OHWE (seismic).slim		



**Northern, Inc.**  
 Consulting Engineers Environmental Scientists Geologists  
 Construction Materials Testing Geophysical Services

Project		Yakima River Gateway Project	
Analysis Description		Section A-A' - Post Construction - Steady-State Seepage @ DFE (Static)	
Drawn By	KAH	Scale	1:109
Date		Company	GN Northern, Inc.
		File Name	A-A' - WALLS - Steady Seepage - DFE.slim

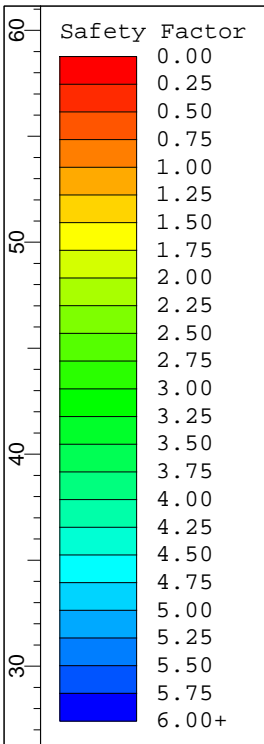


Material Name	Color	Unit Weight (lbs/ft <sup>3</sup> )	Strength Type	Cohesion (psf)	Phi (deg)
Concrete	Grey	150	Infinite strength		
Berm Fill	Light Grey	130	Mohr-Coulomb	0	38
Sandy Gravel	Dark Grey	130	Mohr-Coulomb	0	35
Silt w/Sand / Silty Sand	Tan	112	Mohr-Coulomb	0	31
Silty Sandy Gravel	Dark Grey	134	Mohr-Coulomb	0	38
Silt	Teal	115	Mohr-Coulomb	250	28
Crushed Rock	Purple	140	Mohr-Coulomb	0	45
Compacted Backfill	Brown	130	Mohr-Coulomb	25	34
RipRap	Light Blue	145	Mohr-Coulomb	0	40

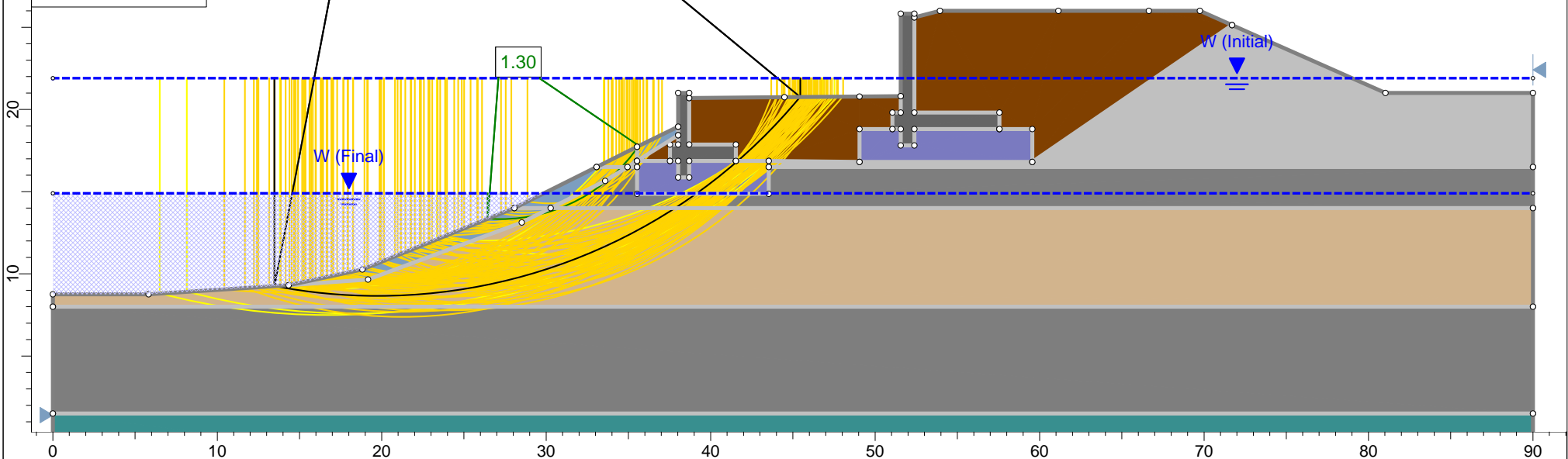
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 Construction Materials Testing Geophysical Services

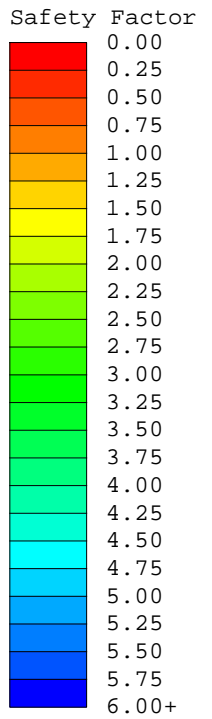
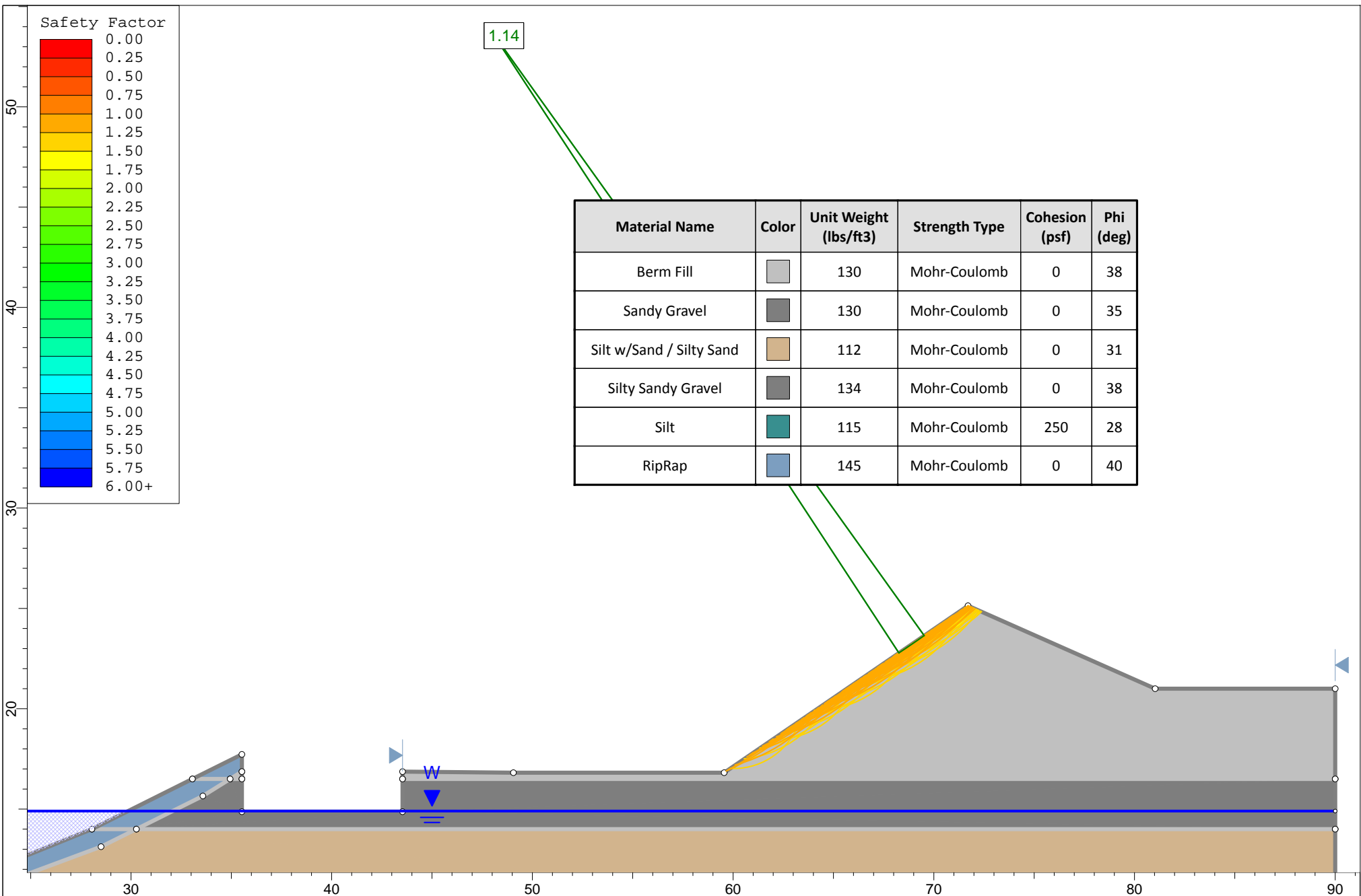
Project			Yakima River Gateway Project		
Analysis Description			Section A-A' - Post Construction - Steady-State Seepage @ DFE (Seismic)		
Drawn By	KAH	Scale	1:109	Company	GN Northern, Inc.
Date		File Name	A-A' - WALLS - Steady Seepage - DFE (seismic).slim		



Material Name	Color	Unit Weight (lbs/ft <sup>3</sup> )	Strength Type	Cohesion (psf)	Phi (deg)	RD Envelope Type	RD Cr (psf)	RD PhiR (deg)
Berm Fill		130	Mohr-Coulomb	0	38	Total stress R linear	0.1	37
Sandy Gravel		130	Mohr-Coulomb	0	35	Total stress R linear	0.1	34
Silt w/Sand / Silty Sand		112	Mohr-Coulomb	0	31	Total stress R linear	150	30
Silty Sandy Gravel		134	Mohr-Coulomb	0	38	Total stress R linear	0.1	37
Silt		115	Mohr-Coulomb	250	28	Total stress R linear	300	27
Crushed Rock		140	Mohr-Coulomb	0	45	Total stress R linear	0.1	43
Compacted Backfill		130	Mohr-Coulomb	25	34	Total stress R linear	50	33
RipRap		145	Mohr-Coulomb	0	40	Total stress R linear	0.1	40



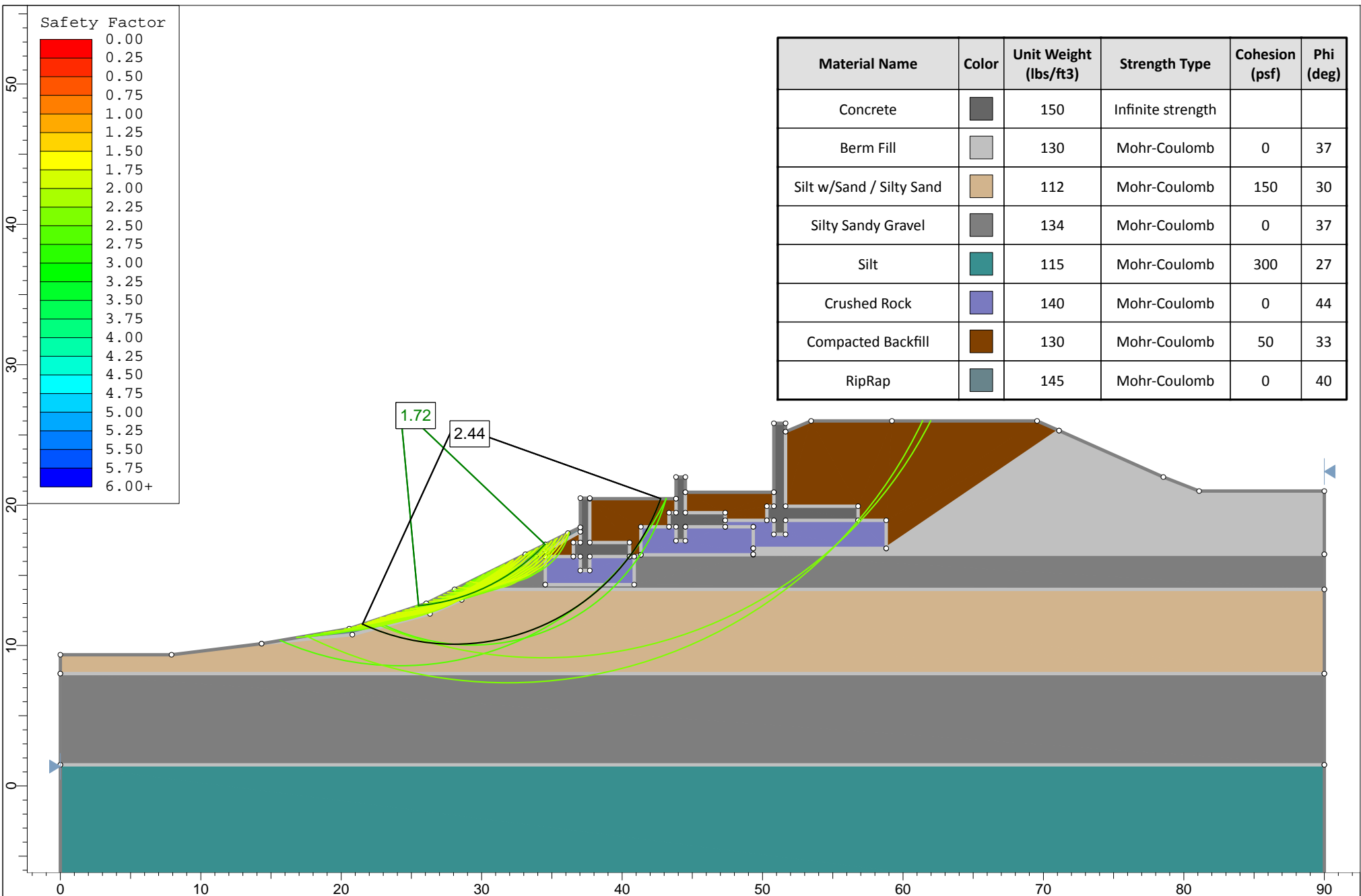

<p><b>Northern, Inc.</b>          Consulting Engineers Environmental Scientists Geologists          Construction Materials Testing Geophysical Services</p>	Project			Yakima River Gateway Project								
	Analysis Description						Section A-A' - Post Construction - Multi-Stage Rapid Drawdown (Static)					
	Drawn By			Scale			Company					
	KAH			1:109			GN Northern, Inc.					
Date			File Name			A-A' - WALLS - Rapid Drawdown.slim						



Material Name	Color	Unit Weight (lbs/ft <sup>3</sup> )	Strength Type	Cohesion (psf)	Phi (deg)
Berm Fill	Light Gray	130	Mohr-Coulomb	0	38
Sandy Gravel	Dark Gray	130	Mohr-Coulomb	0	35
Silt w/Sand / Silty Sand	Tan	112	Mohr-Coulomb	0	31
Silty Sandy Gravel	Medium Gray	134	Mohr-Coulomb	0	38
Silt	Teal	115	Mohr-Coulomb	250	28
RipRap	Blue	145	Mohr-Coulomb	0	40

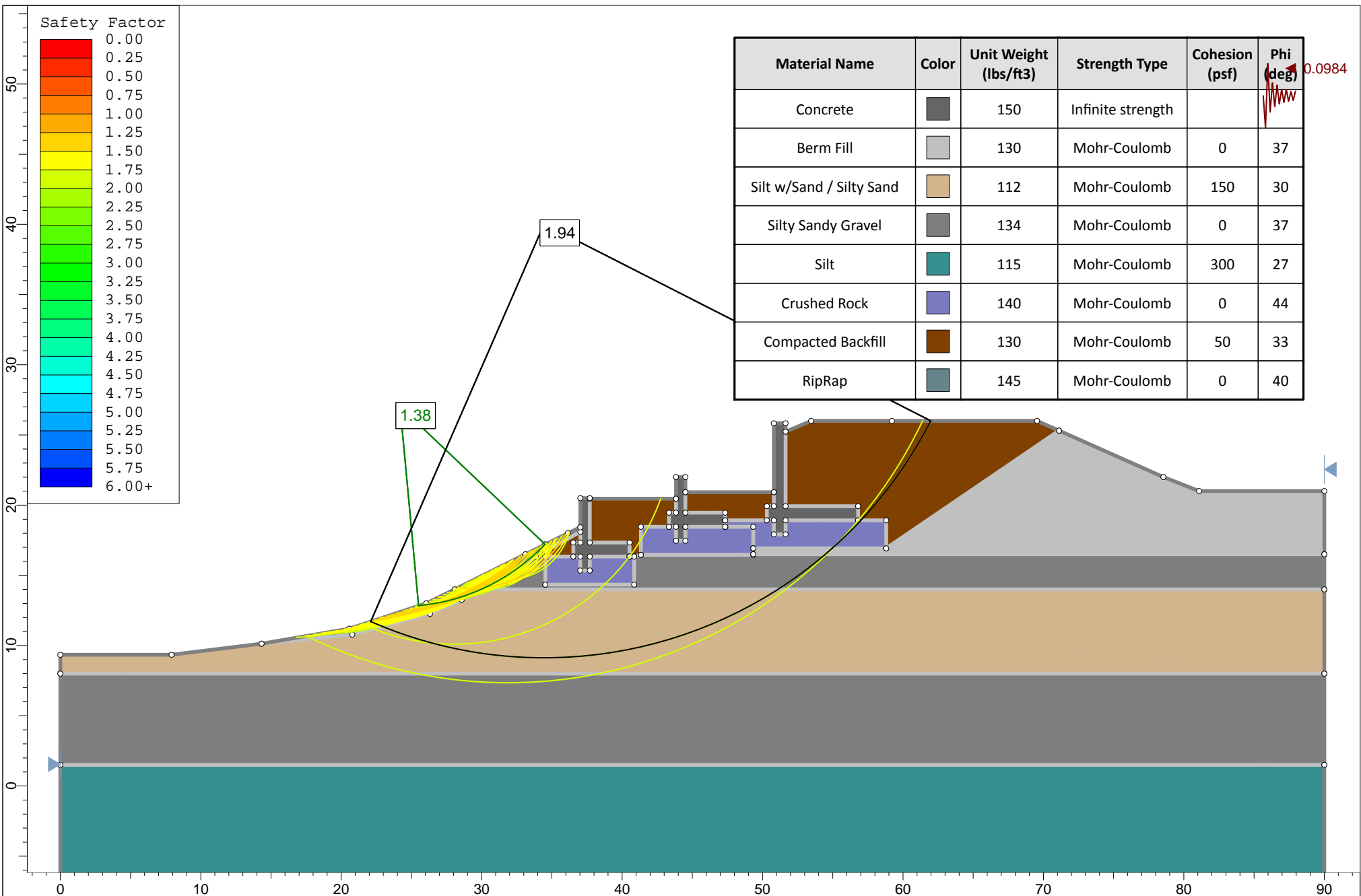
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 Construction Materials Testing Geophysical Services


Project				Yakima River Gateway Project	
Analysis Description				Section A-A' - During Construction - Temp. 1.5H:1V Cut Slope	
Drawn By	KAH	Scale	1:77	Company	GN Northern, Inc.
Date				File Name	A-A' -Temp Cut.slim

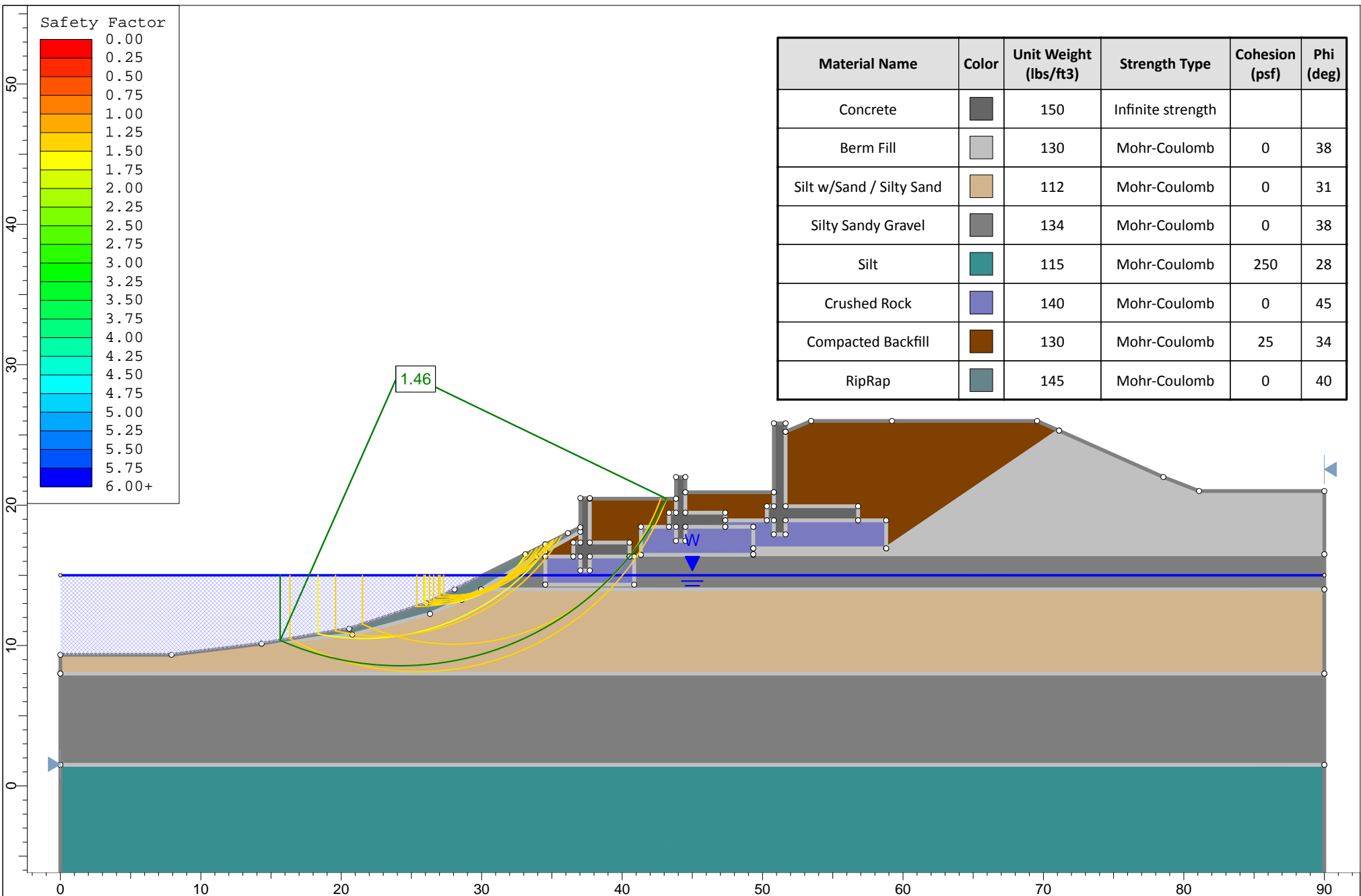
**Northern, Inc.**  
 Consulting Engineers Environmental Scientists Geologists  
 Construction Materials Testing Geophysical Services

Project			Yakima River Gateway Project		
Analysis Description			Section B-B' - End of Construction (Static)		
Drawn By	KAH	Scale	1:110	Company	GN Northern, Inc.
Date		File Name	B-B' - WALLS - End of Construction.slim		



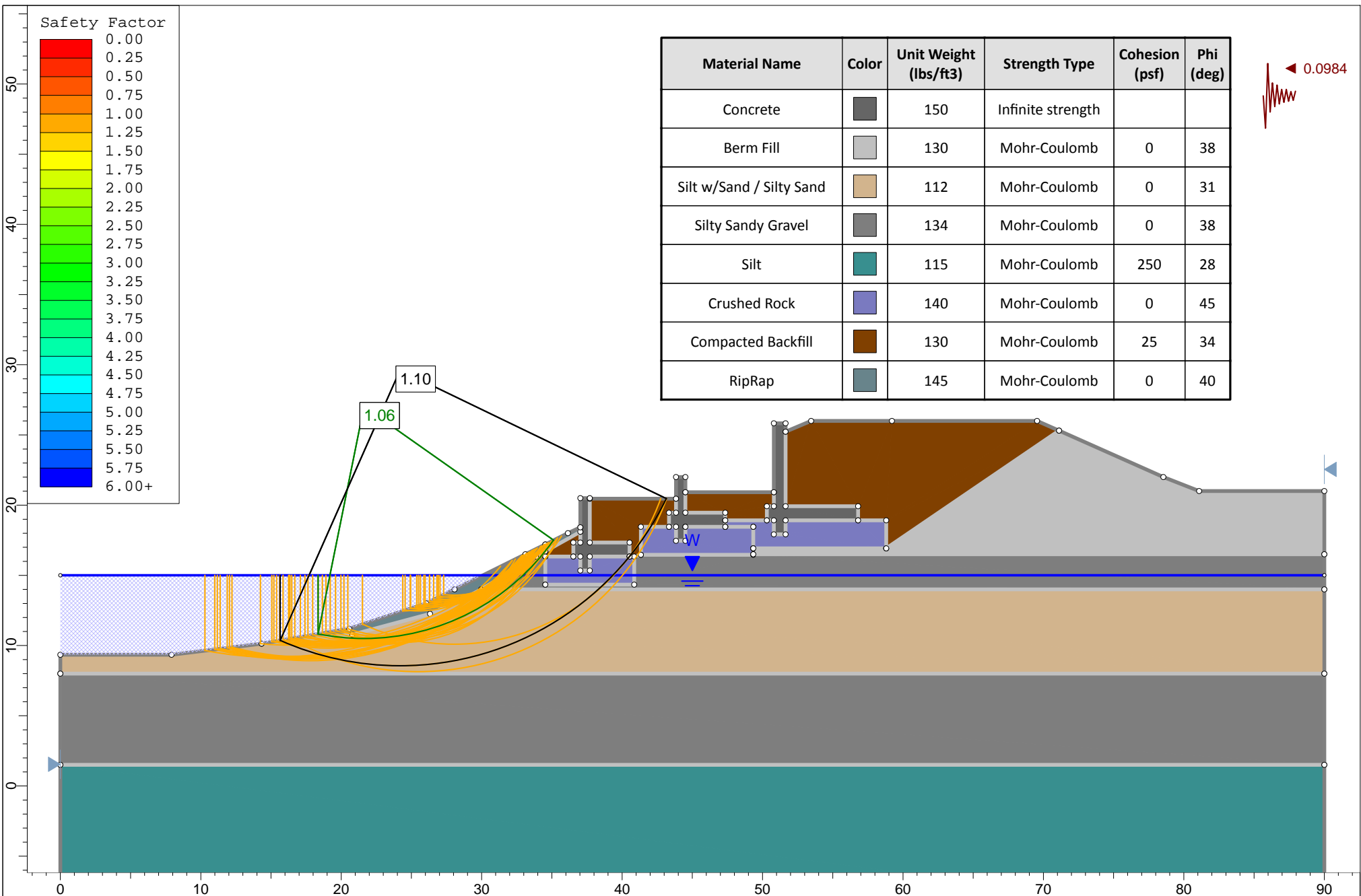
 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project		
	Yakima River Gateway Project		
	Analysis Description		
	Section B-B' - End of Construction (Seismic)		
Drawn By	KAH	Scale	1:110
Date		Company	GN Northern, Inc.
		File Name	B-B' - WALLS - End of Construction (seismic).slim





**Northern, Inc.**  
 Consulting Engineers Environmental Scientists Geologists  
 Construction Materials Testing Geophysical Services

Project		Yakima River Gateway Project	
Analysis Description		Section B-B' - Post Construction - Steady-State Seepage @ OHWE (Static)	
Drawn By	KAH	Scale	1:110
Date		Company	GN Northern, Inc.
		File Name	B-B' - WALLS - Steady Seepage - OHWE.slim

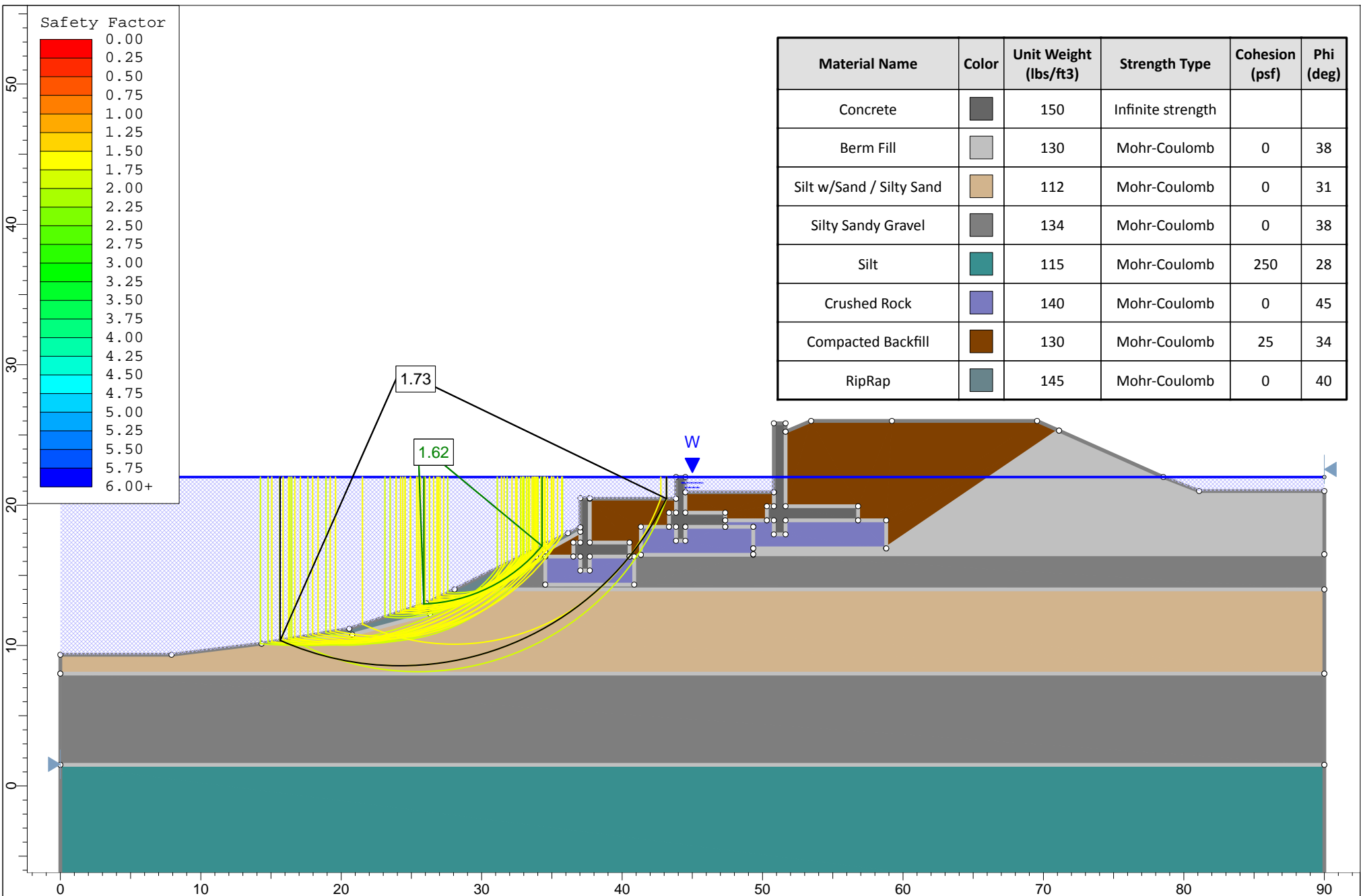



Material Name	Color	Unit Weight (lbs/ft <sup>3</sup> )	Strength Type	Cohesion (psf)	Phi (deg)
Concrete	Grey	150	Infinite strength		
Berm Fill	Light Grey	130	Mohr-Coulomb	0	38
Silt w/Sand / Silty Sand	Tan	112	Mohr-Coulomb	0	31
Silty Sandy Gravel	Dark Grey	134	Mohr-Coulomb	0	38
Silt	Teal	115	Mohr-Coulomb	250	28
Crushed Rock	Blue	140	Mohr-Coulomb	0	45
Compacted Backfill	Brown	130	Mohr-Coulomb	25	34
RipRap	Dark Blue	145	Mohr-Coulomb	0	40

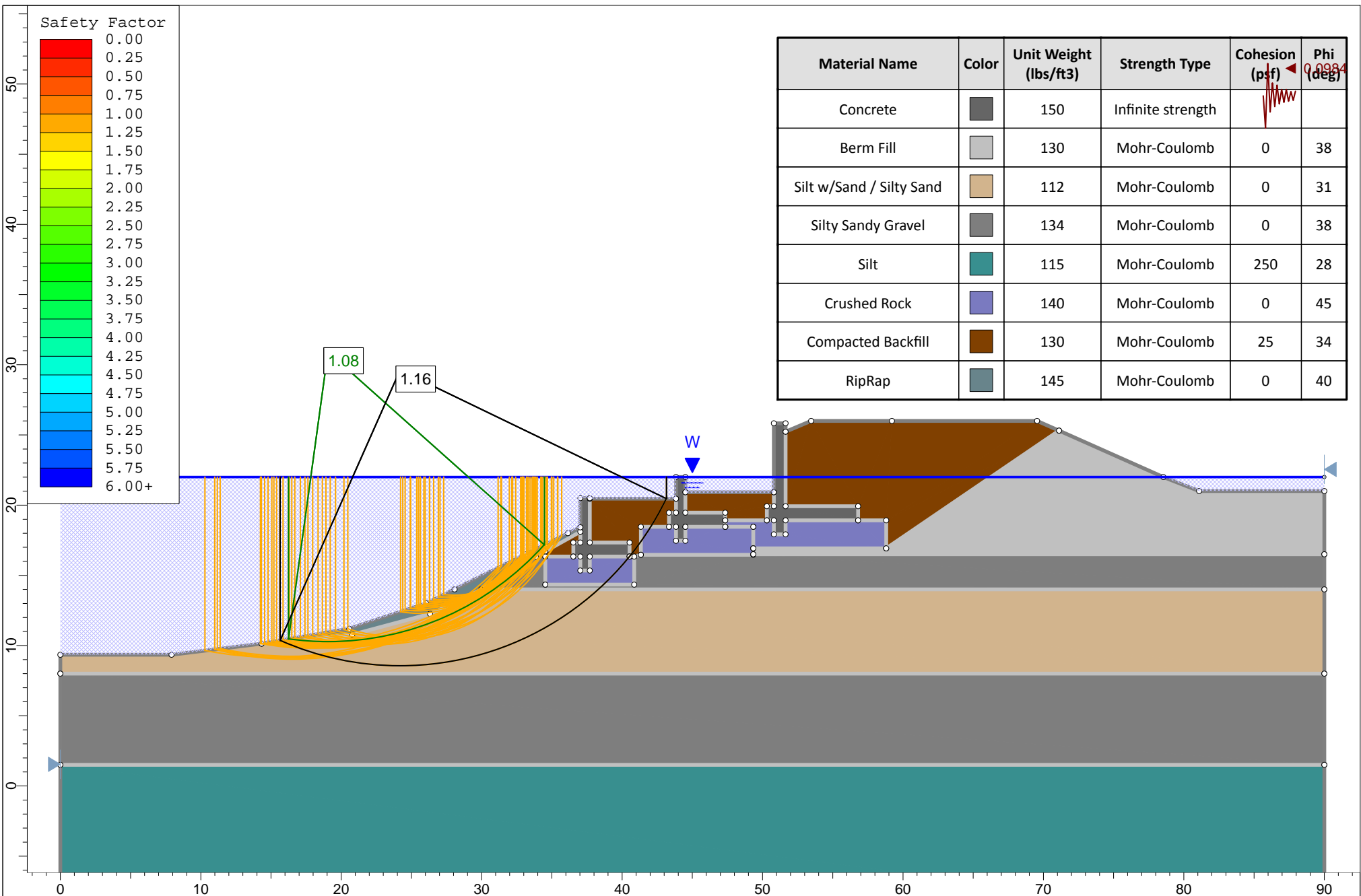
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**Northern, Inc.**  
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 Construction Materials Testing Geophysical Services

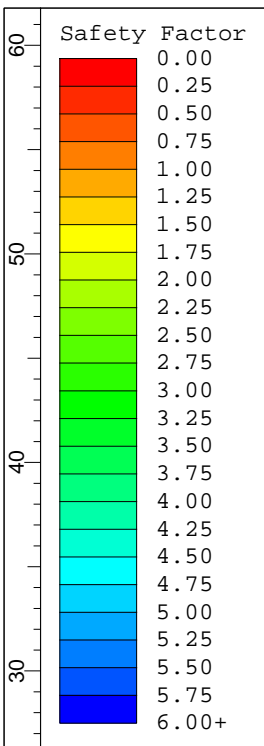
Project				Yakima River Gateway Project			
Analysis Description				Section B-B' - Post Construction - Steady-State Seepage @ OHWE (Seismic)			
Drawn By		KAH		Scale		1:110	
Date				Company		GN Northern, Inc.	
				File Name B-B' - WALLS - Steady Seepage - OHWE (seismic).slim			



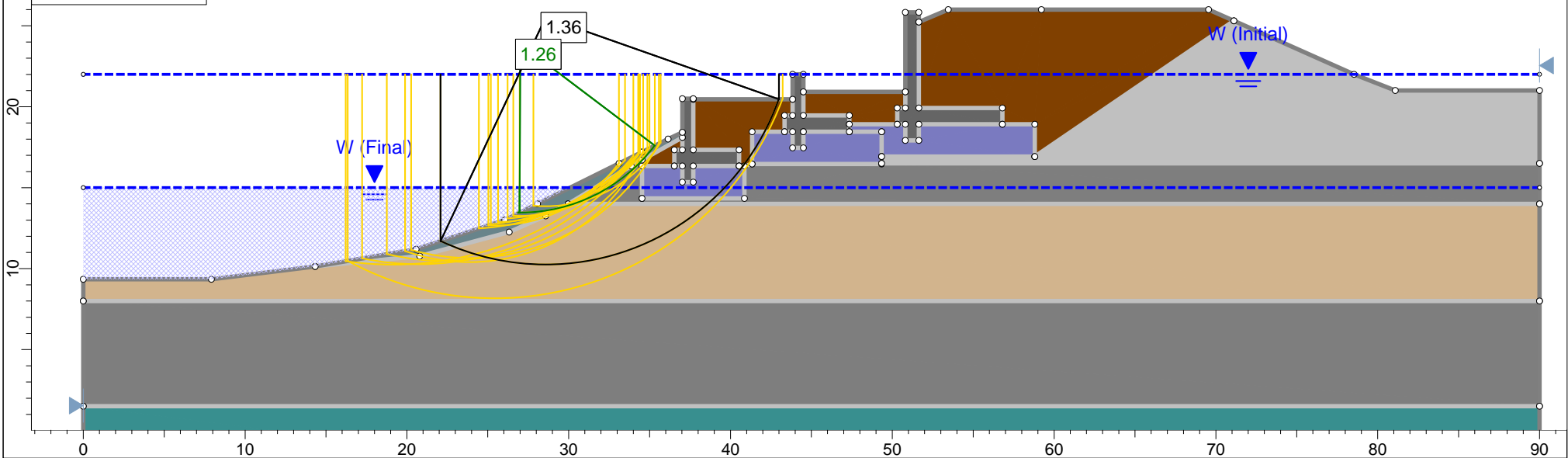
 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project			Yakima River Gateway Project		
	Analysis Description			Section B-B' - Post Construction - Steady-State Seepage @ DFE (Static)		
	Drawn By	KAH	Scale	1:110	Company	GN Northern, Inc.
	Date		File Name	B-B' - WALLS - Steady Seepage - DFE.slim		



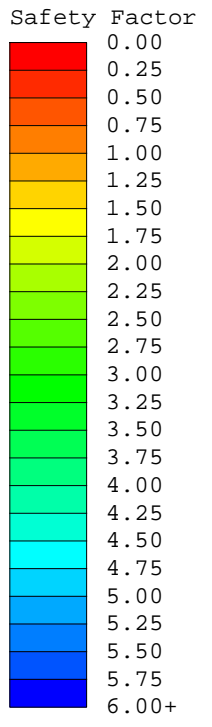
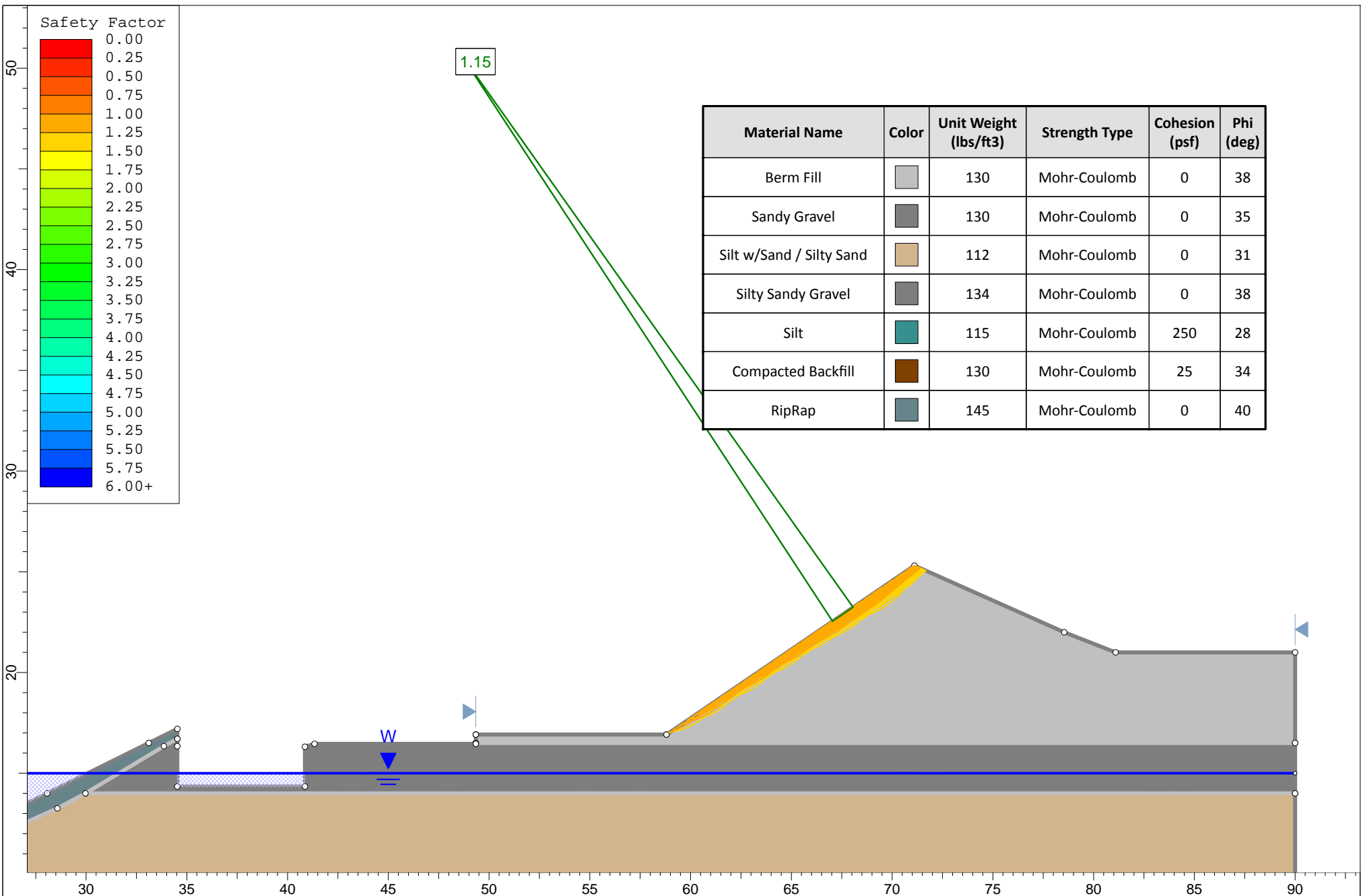
 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project			Yakima River Gateway Project														
	Analysis Description						Section B-B' - Post Construction - Steady-State Seepage @ DFE (Seismic)											
	Drawn By			KAH			Scale			1:110			Company			GN Northern, Inc.		
	Date						File Name						B-B' - WALLS - Steady Seepage - DFE (seismic).slim					




Material Name	Color	Unit Weight (lbs/ft <sup>3</sup> )	Strength Type	Cohesion (psf)	Phi (deg)	RD Envelope Type	RD Cr (psf)	RD PhiR (deg)
Berm Fill		130	Mohr-Coulomb	0	38	Total stress R linear	0.1	37
Sandy Gravel		130	Mohr-Coulomb	0	35	Total stress R linear	0.1	34
Silt w/Sand / Silty Sand		112	Mohr-Coulomb	0	31	Total stress R linear	150	30
Silty Sandy Gravel		134	Mohr-Coulomb	0	38	Total stress R linear	0.1	37
Silt		115	Mohr-Coulomb	250	28	Total stress R linear	300	27
Crushed Rock		140	Mohr-Coulomb	0	45	Total stress R linear	0.1	44
Compacted Backfill		130	Mohr-Coulomb	25	34	Total stress R linear	25	33
RipRap		145	Mohr-Coulomb	0	40	Total stress R linear	0.1	40

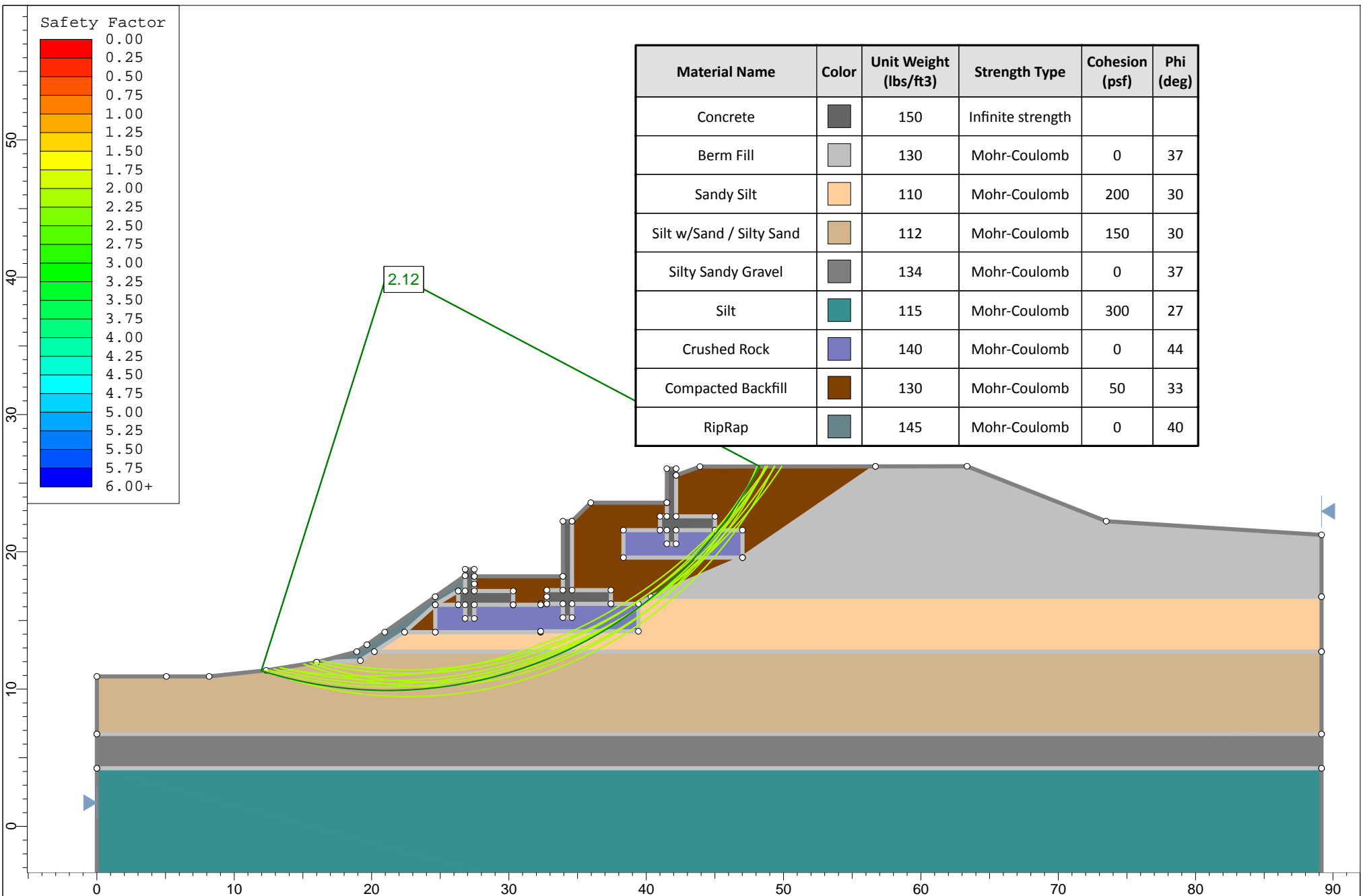



<p><b>Northern, Inc.</b>          Consulting Engineers Environmental Scientists Geologists          Construction Materials Testing Geophysical Services</p>	Project			Yakima River Gateway Project		
	Analysis Description			Section B-B' - Post Construction - Multi-Stage Rapid Drawdown (Static)		
	Drawn By	KAH	Scale	1:110	Company	GN Northern, Inc.
	Date		File Name	B-B' - WALLS - Rapid Drawdown.slim		

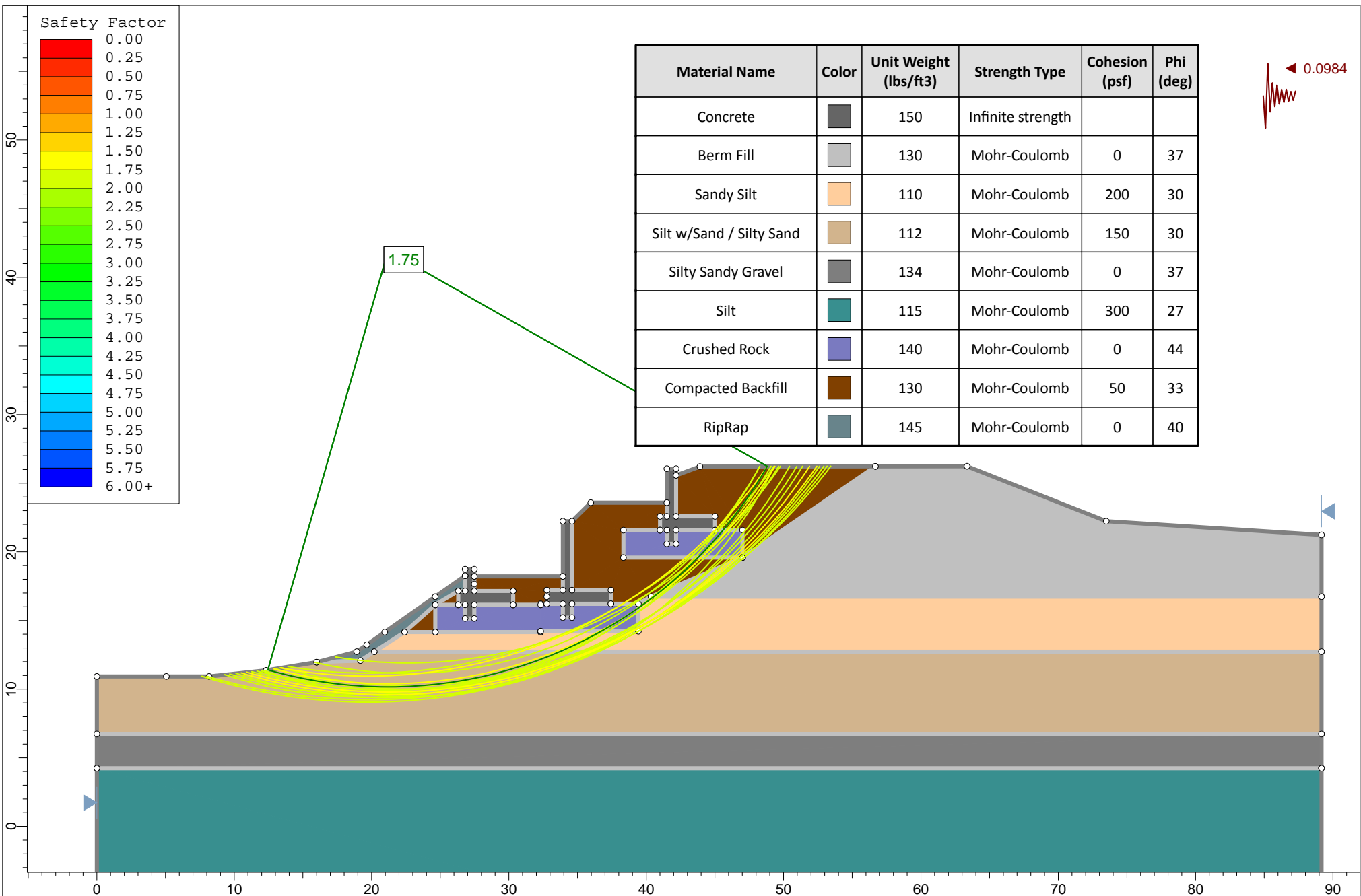



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Berm Fill	[Light Gray]	130	Mohr-Coulomb	0	38
Sandy Gravel	[Dark Gray]	130	Mohr-Coulomb	0	35
Silt w/Sand / Silty Sand	[Light Brown]	112	Mohr-Coulomb	0	31
Silty Sandy Gravel	[Medium Gray]	134	Mohr-Coulomb	0	38
Silt	[Teal]	115	Mohr-Coulomb	250	28
Compacted Backfill	[Brown]	130	Mohr-Coulomb	25	34
RipRap	[Blue-Gray]	145	Mohr-Coulomb	0	40

 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	<b>Project</b> Yakima River Gateway Project		
	<b>Analysis Description</b> Section B-B' - During Construction - Temp. 1.5H:1V Cut Slope		
	<b>Drawn By</b> KAH	<b>Scale</b> 1:77	<b>Company</b> GN Northern, Inc.
	<b>Date</b>		<b>File Name</b> B-B' - Temp Cut.slim

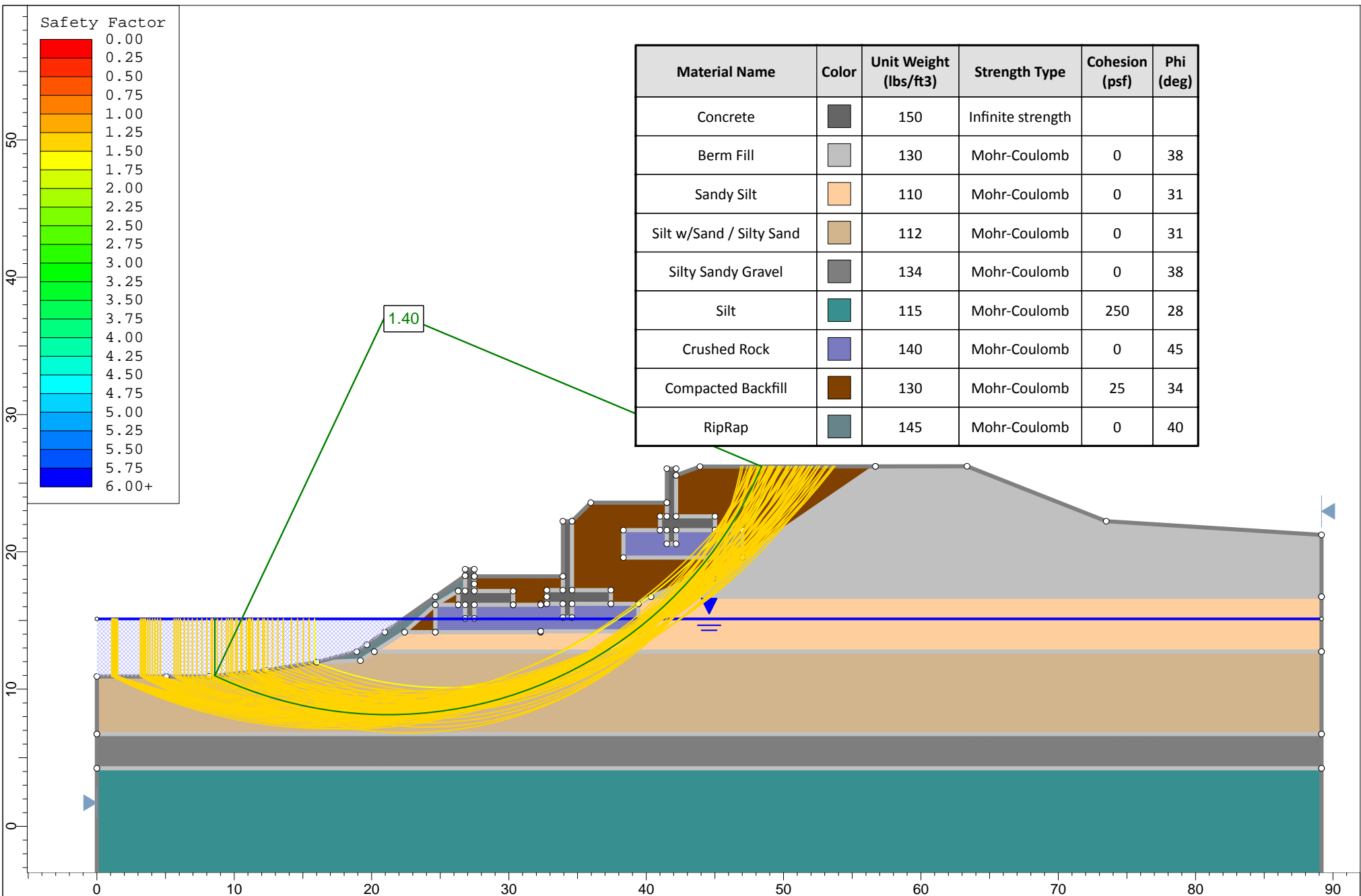


 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project		
	Yakima River Gateway Project		
	Analysis Description		
	Section C-C' - End of Construction (Static)		
Drawn By	KAH	Scale	1:113
Date		Company	GN Northern, Inc.
		File Name	C-C' - WALLS - End of Construction.slim

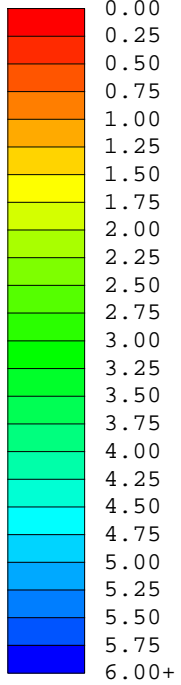


 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project		
	Yakima River Gateway Project		
	Analysis Description		
	Section C-C' - End of Construction (Seismic)		
Drawn By	KAH	Scale	1:113
Date		Company	GN Northern, Inc.
		File Name	C-C' - WALLS - End of Construction (seismic).slim





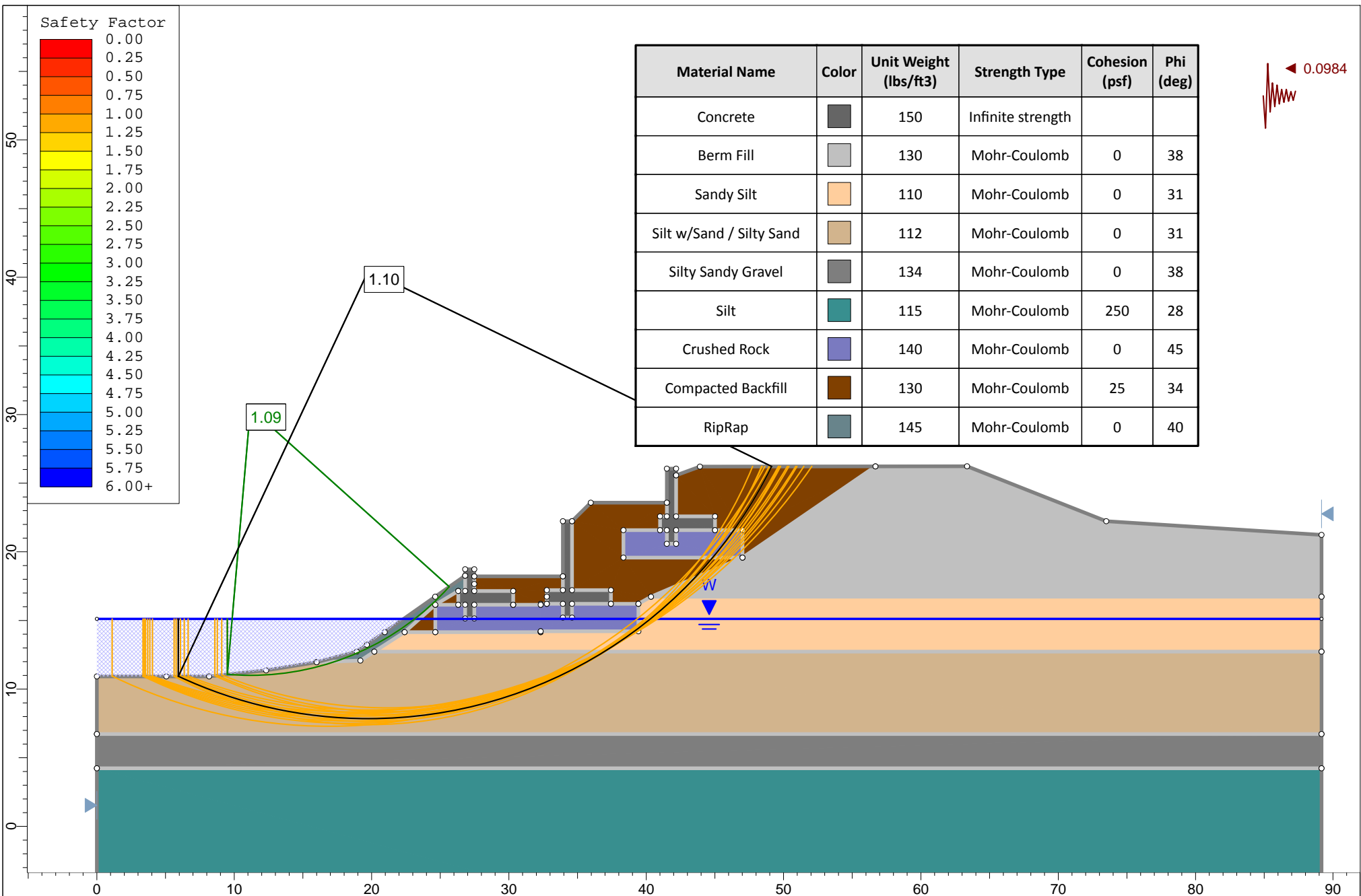
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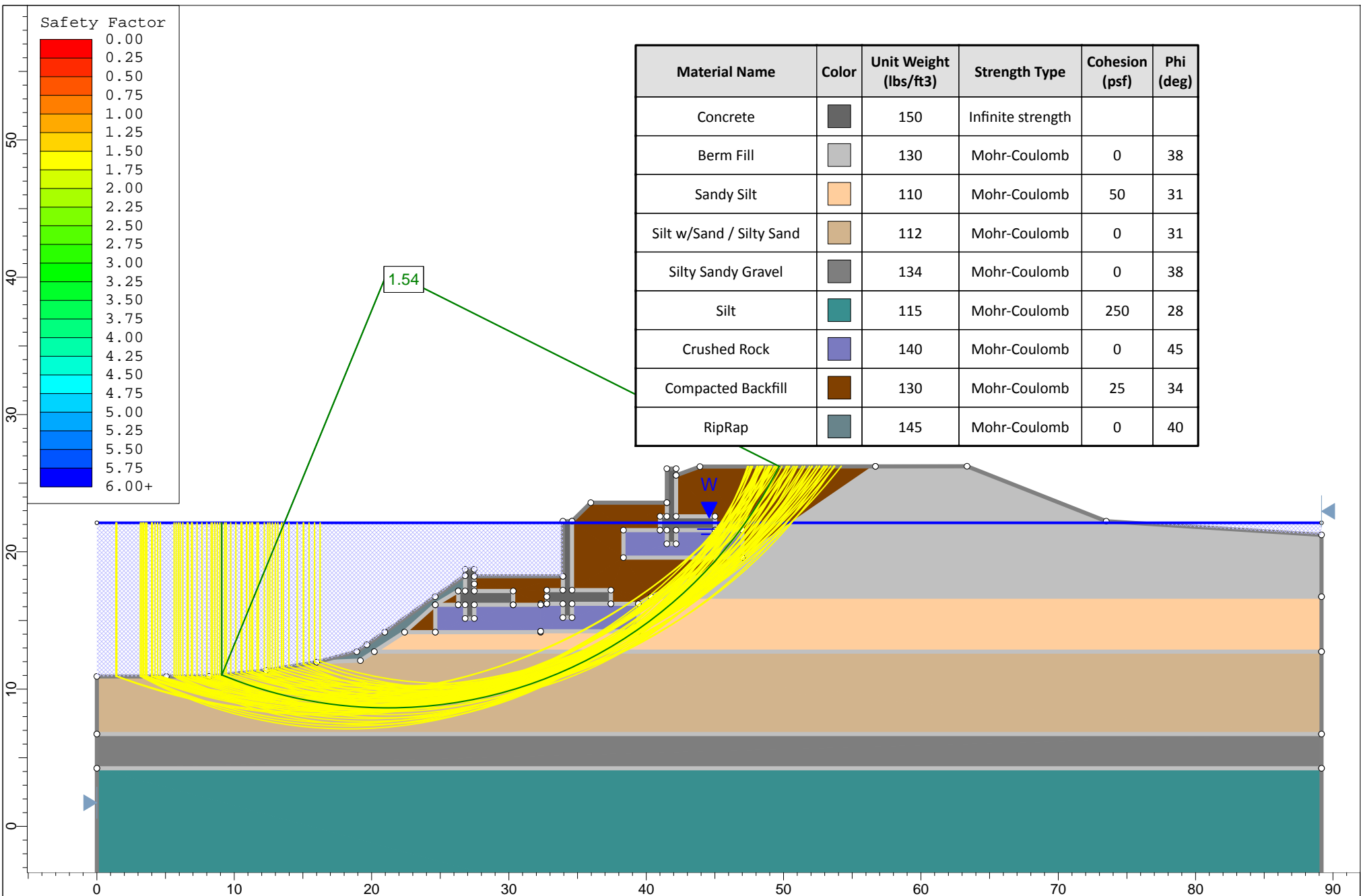
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Concrete	Dark Grey	150	Infinite strength		
Berm Fill	Light Grey	130	Mohr-Coulomb	0	38
Sandy Silt	Light Orange	110	Mohr-Coulomb	0	31
Silt w/Sand / Silty Sand	Light Brown	112	Mohr-Coulomb	0	31
Silty Sandy Gravel	Dark Grey	134	Mohr-Coulomb	0	38
Silt	Teal	115	Mohr-Coulomb	250	28
Crushed Rock	Purple	140	Mohr-Coulomb	0	45
Compacted Backfill	Brown	130	Mohr-Coulomb	25	34
RipRap	Dark Blue-Gray	145	Mohr-Coulomb	0	40


1.40

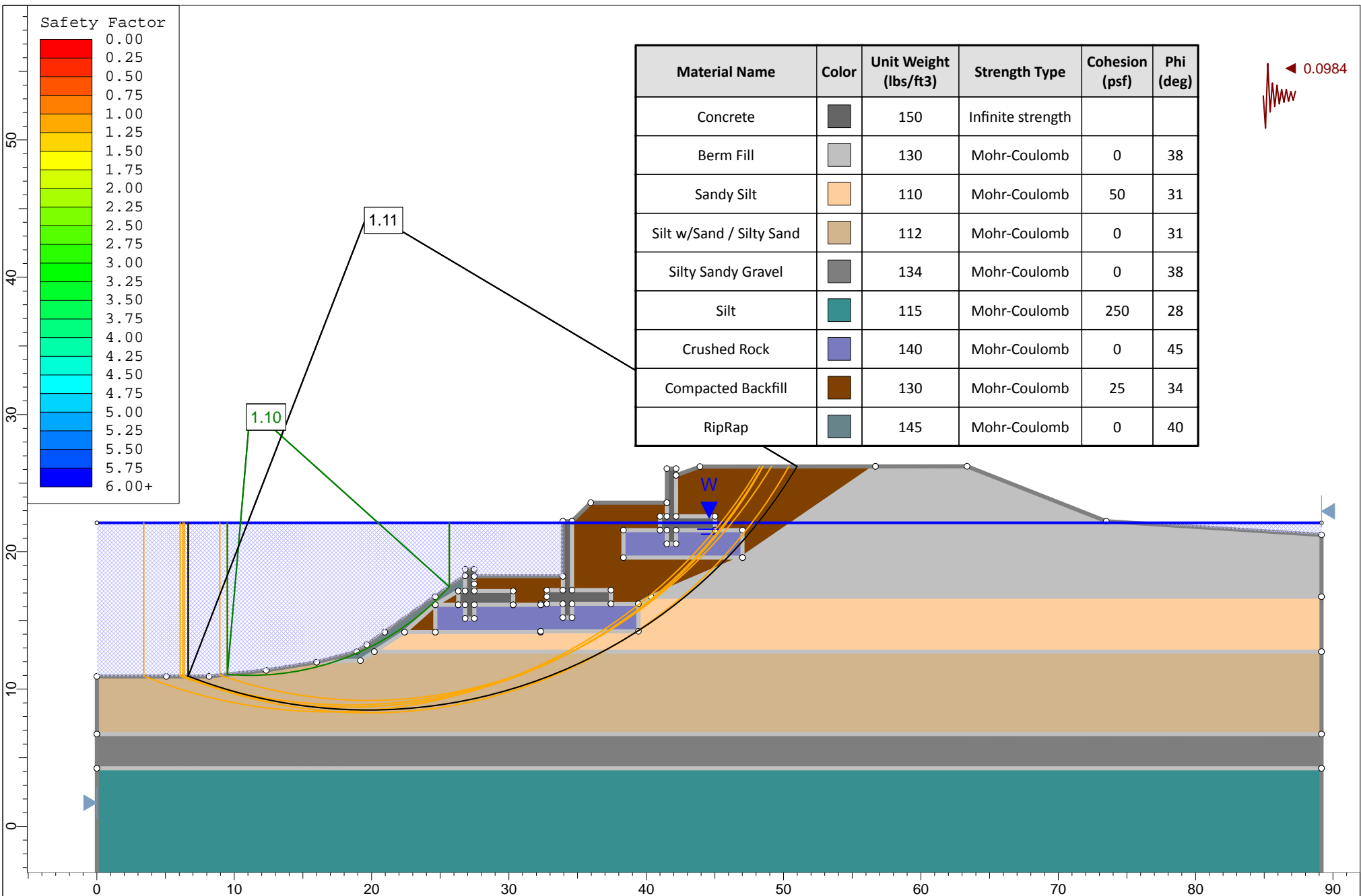
<p><b>Northern, Inc.</b>  <small>Consulting Engineers Environmental Scientists Geologists          Construction Materials Testing Geophysical Services</small></p>	Project		
	Yakima River Gateway Project		
	Analysis Description		
	Section C-C' - Post-Construction - Steady-State Seepage @ OHWE (Static)		
	Drawn By	KAH	Scale
Date		Company	GN Northern, Inc.
		File Name	C-C' - WALLS - Steady Seepage - OHWE.slim




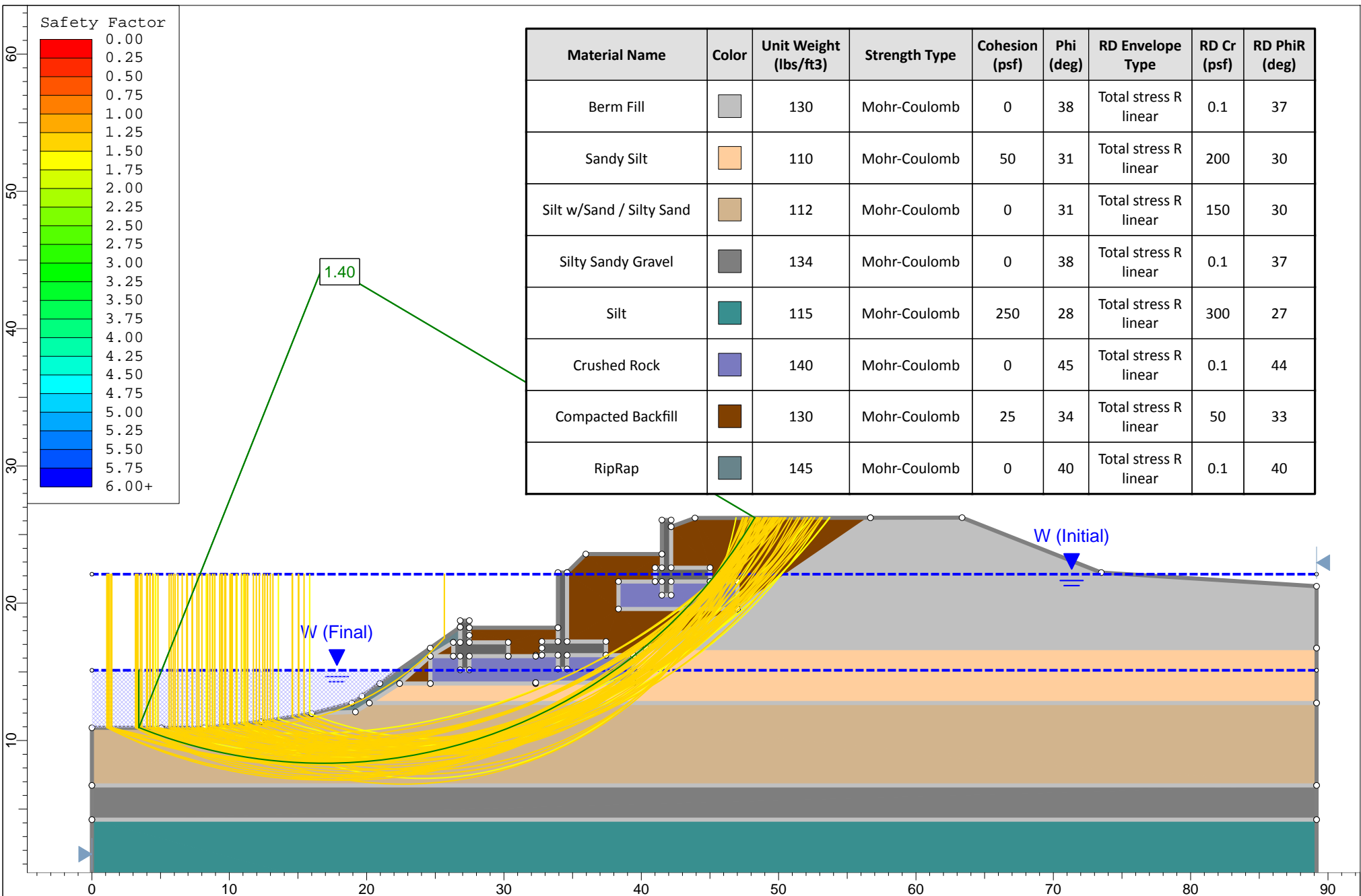
 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project		
	Yakima River Gateway Project		
	Analysis Description		
	Section C-C' - Post-Construction - Steady-State Seepage @ OHWE (Seismic)		
Drawn By	KAH	Scale	1:113
Date		Company	GN Northern, Inc.
		File Name	C-C' - WALLS - Steady Seepage - OHWE (seismic).slim




 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project		
	Yakima River Gateway Project		
	Analysis Description		
	Section C-C' - Post-Construction - Steady-State Seepage @ DFE (Static)		
	Drawn By	KAH	Scale
Date		Company	GN Northern, Inc.
		File Name	C-C' - WALLS - Steady Seepage - DFE.slim

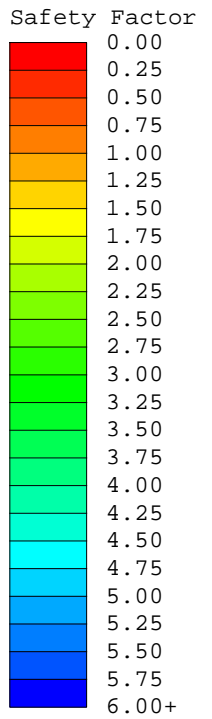
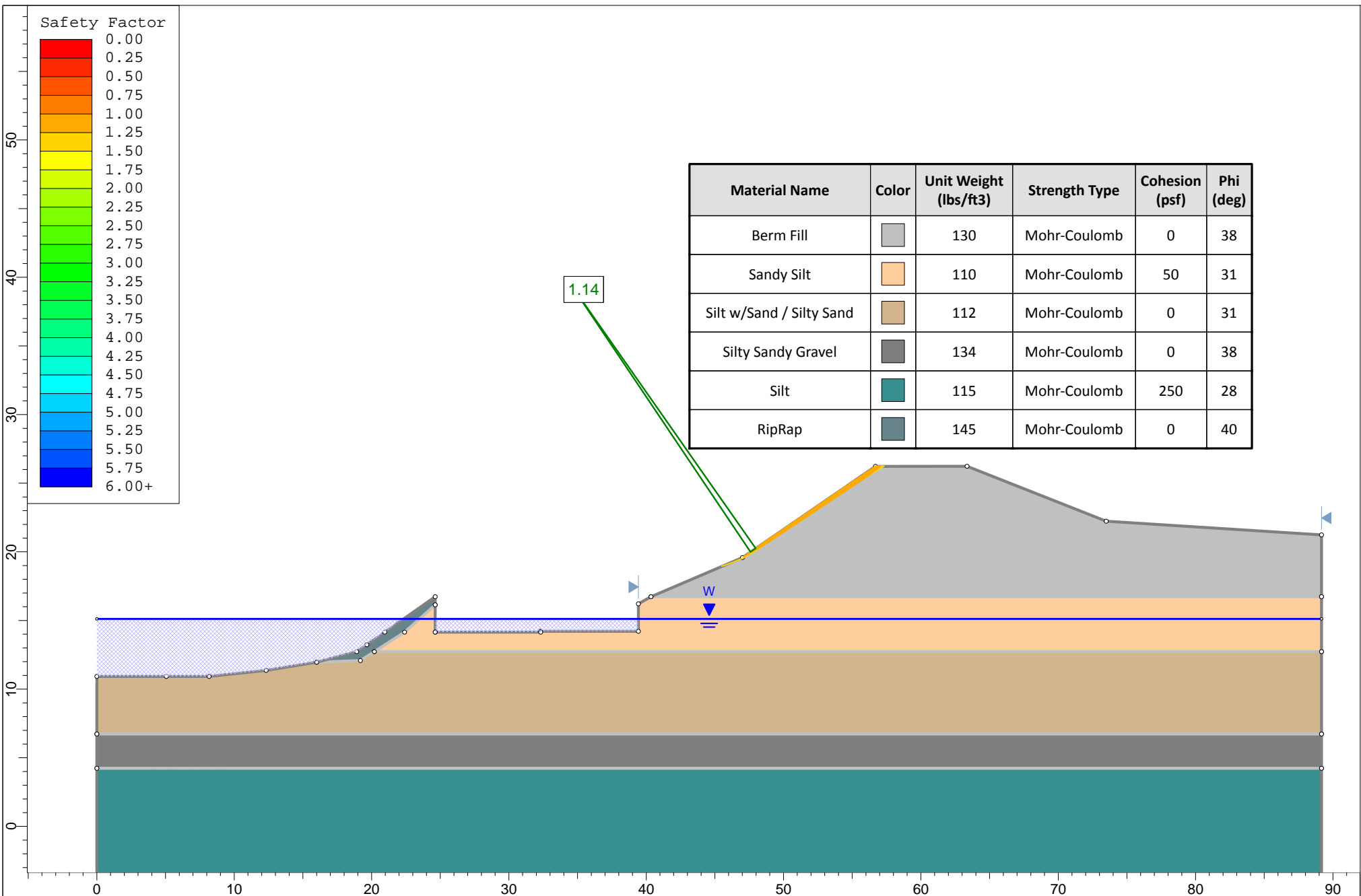


 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project		
	Yakima River Gateway Project		
	Analysis Description		
	Section C-C' - Post-Construction - Steady-State Seepage @ DFE (Seismic)		
	Drawn By	KAH	Scale
Date		Company	GN Northern, Inc.
		File Name	C-C' - WALLS - Steady Seepage - DFE (seismic).slim



Material Name	Color	Unit Weight (lbs/ft <sup>3</sup> )	Strength Type	Cohesion (psf)	Phi (deg)	RD Envelope Type	RD Cr (psf)	RD PhiR (deg)
Berm Fill	Grey	130	Mohr-Coulomb	0	38	Total stress R linear	0.1	37
Sandy Silt	Light Orange	110	Mohr-Coulomb	50	31	Total stress R linear	200	30
Silt w/Sand / Silty Sand	Light Brown	112	Mohr-Coulomb	0	31	Total stress R linear	150	30
Silty Sandy Gravel	Dark Grey	134	Mohr-Coulomb	0	38	Total stress R linear	0.1	37
Silt	Teal	115	Mohr-Coulomb	250	28	Total stress R linear	300	27
Crushed Rock	Purple	140	Mohr-Coulomb	0	45	Total stress R linear	0.1	44
Compacted Backfill	Brown	130	Mohr-Coulomb	25	34	Total stress R linear	50	33
RipRap	Dark Blue-Black	145	Mohr-Coulomb	0	40	Total stress R linear	0.1	40

 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	<b>Project</b> Yakima River Gateway Project		
	<b>Analysis Description</b> Section C-C' - Post-Construction - Multi-Stage Rapid Drawdown (Static)		
	<b>Drawn By</b> KAH	<b>Scale</b> 1:113	<b>Company</b> GN Northern, Inc.
	<b>Date</b>	<b>File Name</b> C-C' - WALLS - Rapid Drawdown.slim	



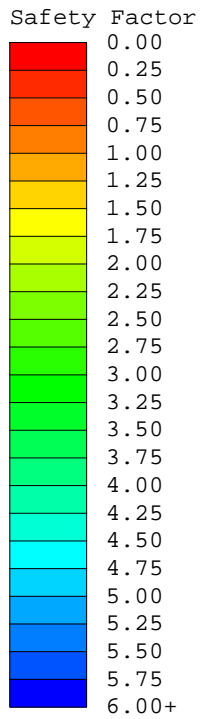
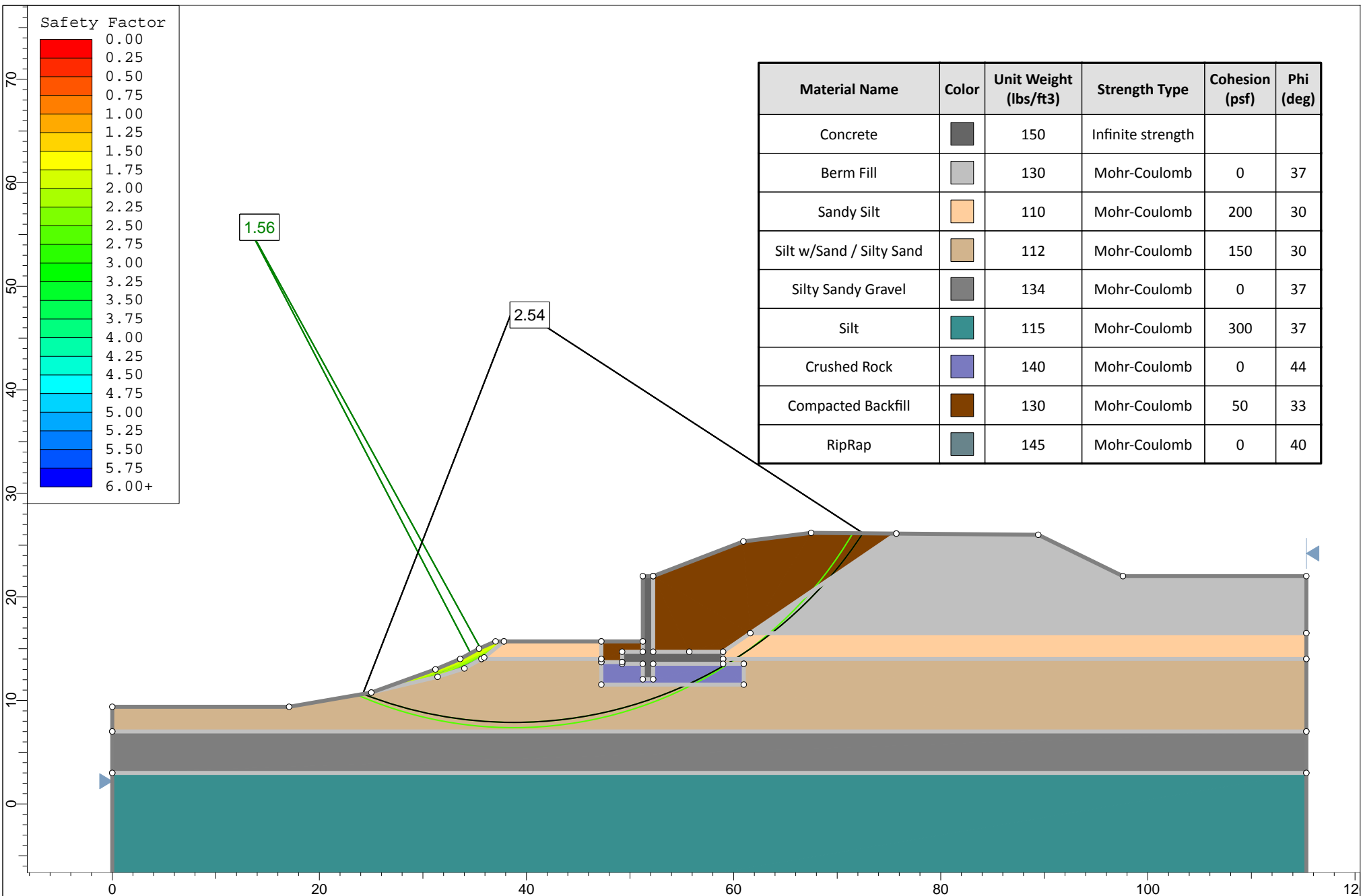
Material Name	Color	Unit Weight (lbs/ft <sup>3</sup> )	Strength Type	Cohesion (psf)	Phi (deg)
Berm Fill		130	Mohr-Coulomb	0	38
Sandy Silt		110	Mohr-Coulomb	50	31
Silt w/Sand / Silty Sand		112	Mohr-Coulomb	0	31
Silty Sandy Gravel		134	Mohr-Coulomb	0	38
Silt		115	Mohr-Coulomb	250	28
RipRap		145	Mohr-Coulomb	0	40

1.14



SLIDEINTERPRET 6.037

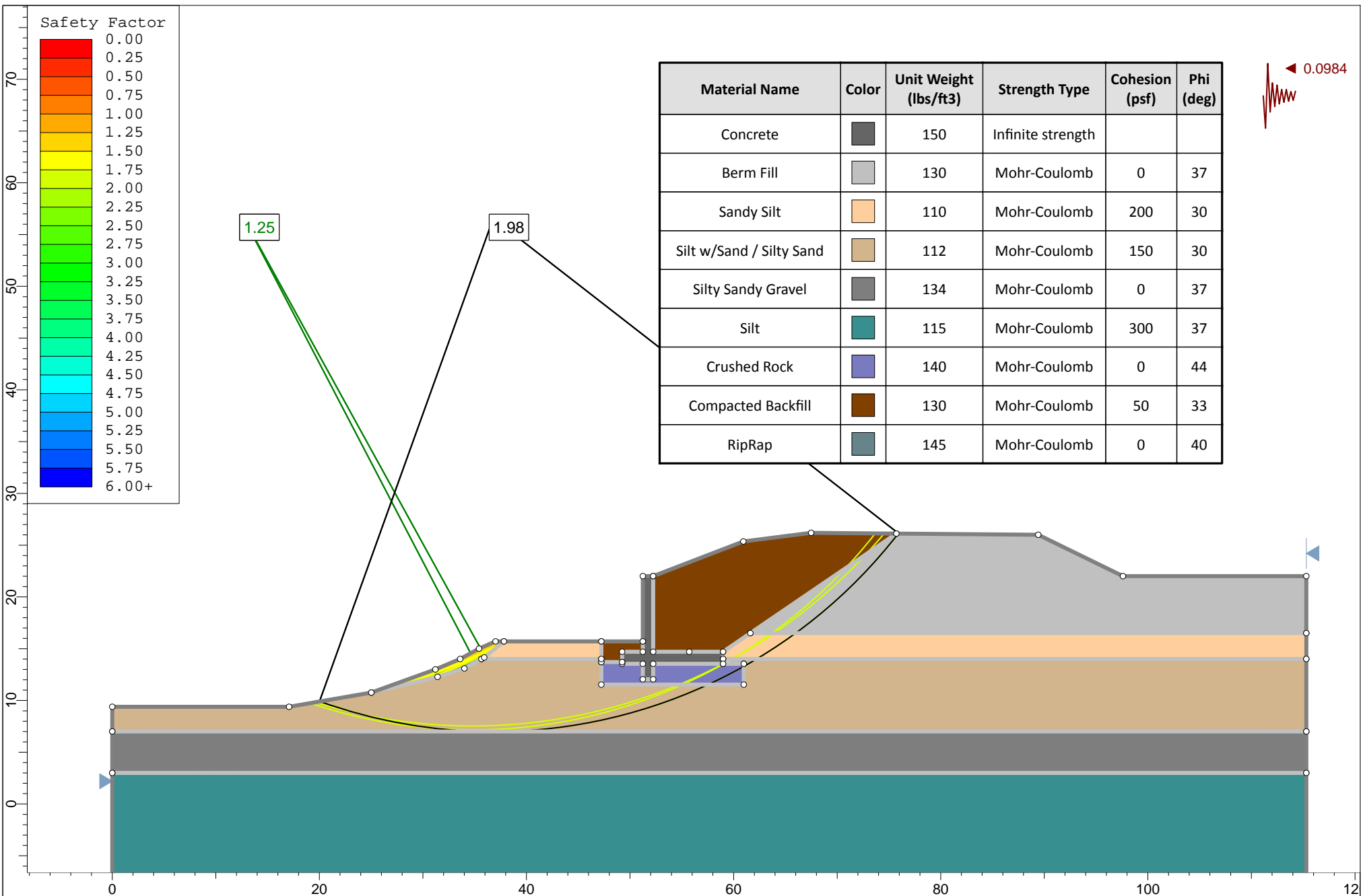
Project		Yakima River Gateway Project	
Analysis Description		Section C-C' - Post-Construction (Static)	
Drawn By	KAH	Scale	1:113
Date		Company	GN Northern, Inc.
		File Name	C-C' - Temp Cut.slim



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Concrete	Grey	150	Infinite strength		
Berm Fill	Light Grey	130	Mohr-Coulomb	0	37
Sandy Silt	Light Orange	110	Mohr-Coulomb	200	30
Silt w/Sand / Silty Sand	Light Brown	112	Mohr-Coulomb	150	30
Silty Sandy Gravel	Dark Grey	134	Mohr-Coulomb	0	37
Silt	Teal	115	Mohr-Coulomb	300	37
Crushed Rock	Purple	140	Mohr-Coulomb	0	44
Compacted Backfill	Brown	130	Mohr-Coulomb	50	33
RipRap	Dark Blue-Teal	145	Mohr-Coulomb	0	40

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Project			Yakima River Gateway Project		
Analysis Description			Section D-D' - End of Construction (Static)		
Drawn By	KAH	Scale	1:150	Company	GN Northern, Inc.
Date		File Name	D-D' - WALLS - End of Construction.slim		



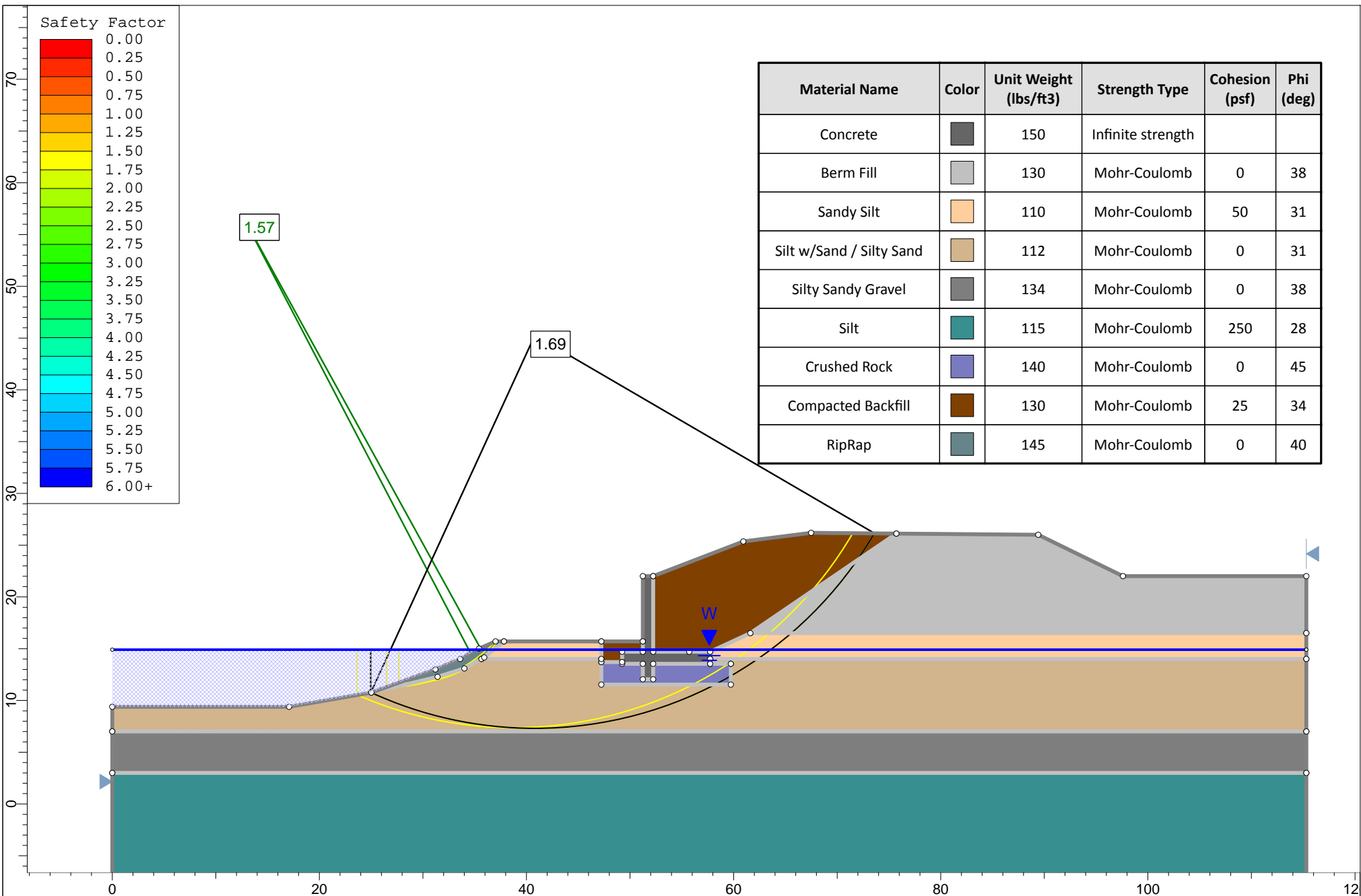
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Concrete	Grey	150	Infinite strength		
Berm Fill	Light Grey	130	Mohr-Coulomb	0	37
Sandy Silt	Light Orange	110	Mohr-Coulomb	200	30
Silt w/Sand / Silty Sand	Light Brown	112	Mohr-Coulomb	150	30
Silty Sandy Gravel	Dark Grey	134	Mohr-Coulomb	0	37
Silt	Teal	115	Mohr-Coulomb	300	37
Crushed Rock	Purple	140	Mohr-Coulomb	0	44
Compacted Backfill	Brown	130	Mohr-Coulomb	50	33
RipRap	Dark Blue-Gray	145	Mohr-Coulomb	0	40

0.0984

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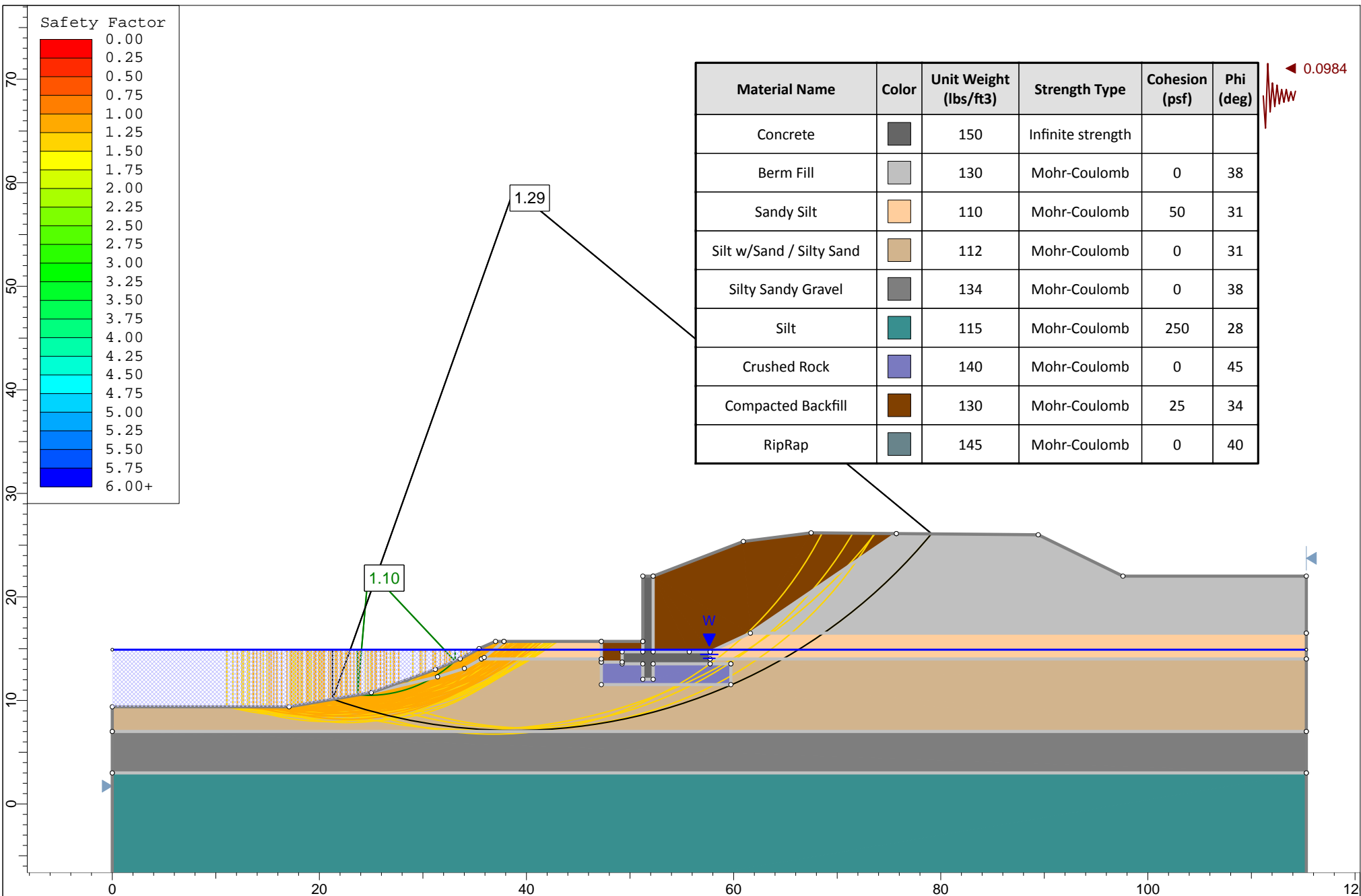
Project			Yakima River Gateway Project		
Analysis Description			Section D-D' - End of Construction (Seismic)		
Drawn By	KAH	Scale	1:150	Company	GN Northern, Inc.
Date		File Name	D-D' - WALLS - End of Construction (seismic).slim		





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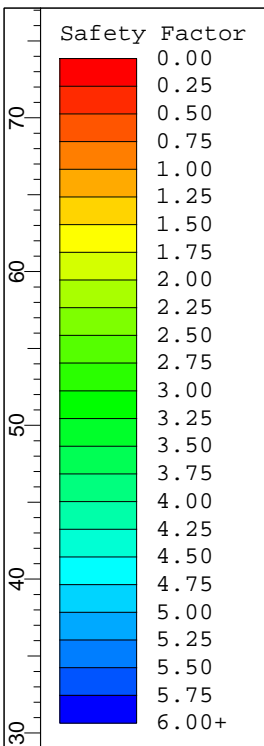
Project				Yakima River Gateway Project	
Analysis Description				Section D-D' - Post-Construction - Steady-State Seepage @ OHWE (Static)	
Drawn By	KAH	Scale	1:150	Company	GN Northern, Inc.
Date		File Name	D-D' - WALLS - Steady Seepage - OHWE.slim		



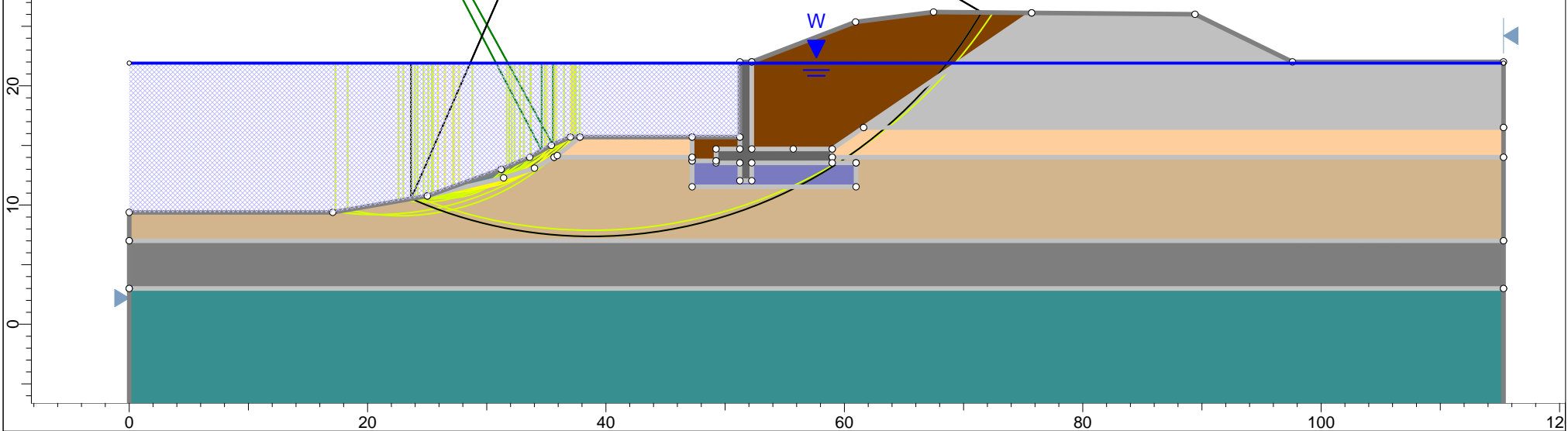
Material Name	Color	Unit Weight (lbs/ft <sup>3</sup> )	Strength Type	Cohesion (psf)	Phi (deg)
Concrete	Grey	150	Infinite strength		
Berm Fill	Light Grey	130	Mohr-Coulomb	0	38
Sandy Silt	Light Orange	110	Mohr-Coulomb	50	31
Silt w/Sand / Silty Sand	Light Brown	112	Mohr-Coulomb	0	31
Silty Sandy Gravel	Dark Grey	134	Mohr-Coulomb	0	38
Silt	Teal	115	Mohr-Coulomb	250	28
Crushed Rock	Purple	140	Mohr-Coulomb	0	45
Compacted Backfill	Brown	130	Mohr-Coulomb	25	34
RipRap	Dark Teal	145	Mohr-Coulomb	0	40



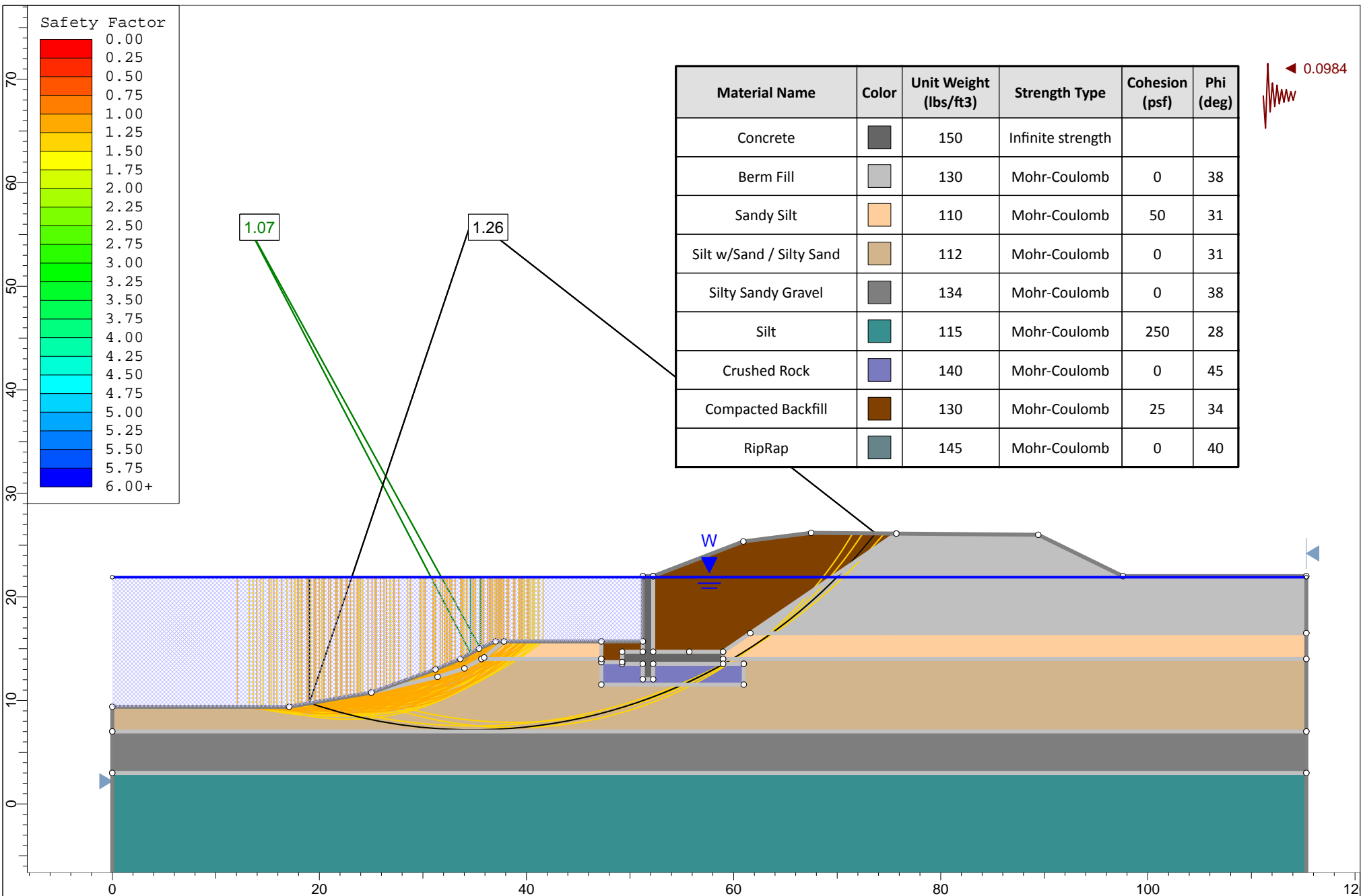
Project				Yakima River Gateway Project	
Analysis Description				Section D-D' - Post-Construction - Steady-State Seepage @ OHWE (Seismic)	
Drawn By	KAH	Scale	1:150	Company	GN Northern, Inc.
Date		File Name	D-D' - WALLS - Steady Seepage - OHWE (seismic).slim		



Material Name	Color	Unit Weight (lbs/ft <sup>3</sup> )	Strength Type	Cohesion (psf)	Phi (deg)
Concrete	Grey	150	Infinite strength		
Berm Fill	Light Grey	130	Mohr-Coulomb	0	38
Sandy Silt	Light Orange	110	Mohr-Coulomb	50	31
Silt w/Sand / Silty Sand	Light Brown	112	Mohr-Coulomb	0	31
Silty Sandy Gravel	Dark Grey	134	Mohr-Coulomb	0	38
Silt	Teal	115	Mohr-Coulomb	250	28
Crushed Rock	Purple	140	Mohr-Coulomb	0	45
Compacted Backfill	Brown	130	Mohr-Coulomb	25	34
RipRap	Dark Grey	145	Mohr-Coulomb	0	40

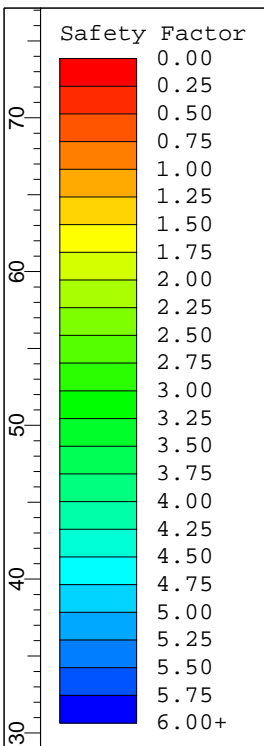


<p><b>Northern, Inc.</b>  <small>Consulting Engineers Environmental Scientists Geologists          Construction Materials Testing Geophysical Services</small></p>	Project <b>Yakima River Gateway Project</b>		
	Analysis Description <b>Section D-D' - Post-Construction - Steady-State Seepage @ DFE (Static)</b>		
	Drawn By <b>KAH</b>	Scale <b>1:150</b>	Company <b>GN Northern, Inc.</b>
	Date	File Name <b>D-D' - WALLS - Steady Seepage - DFE.slim</b>	

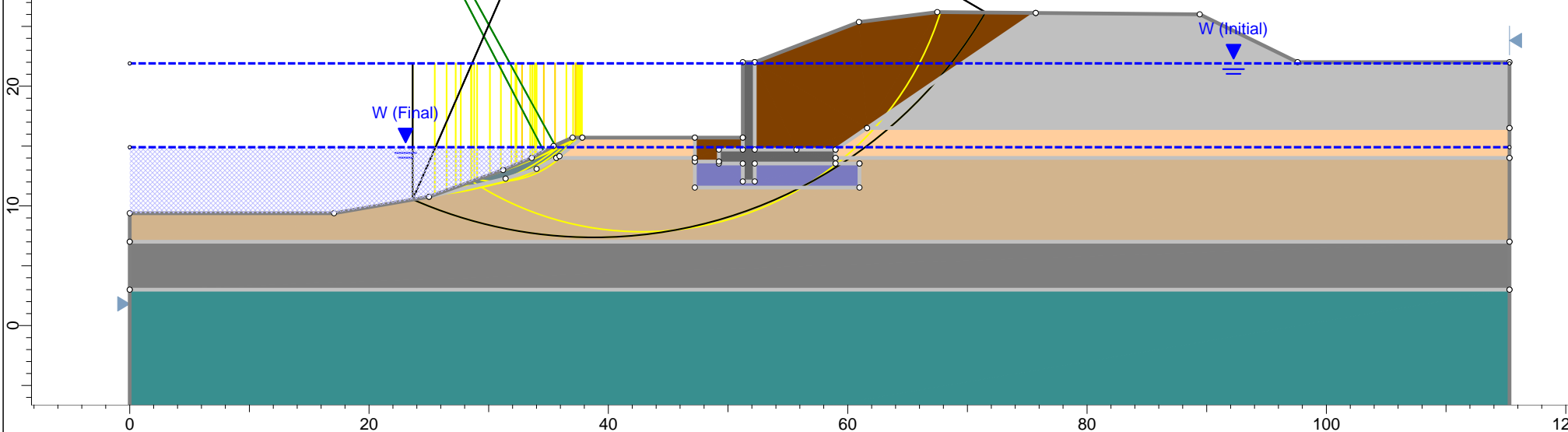


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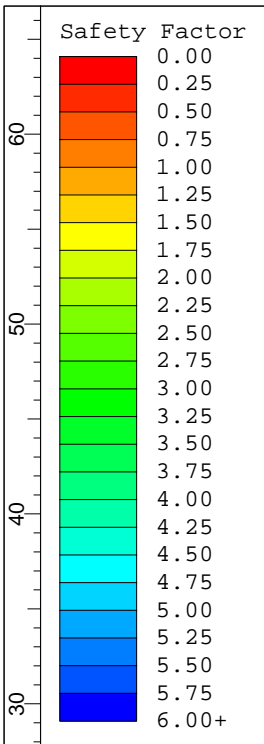
Project			Yakima River Gateway Project		
Analysis Description			Section D-D' - Post-Construction - Steady-State Seepage @ DFE (Seismic)		
Drawn By	KAH	Scale	1:150	Company	GN Northern, Inc.
Date		File Name	D-D' - WALLS - Steady Seepage - DFE (seismic).slim		



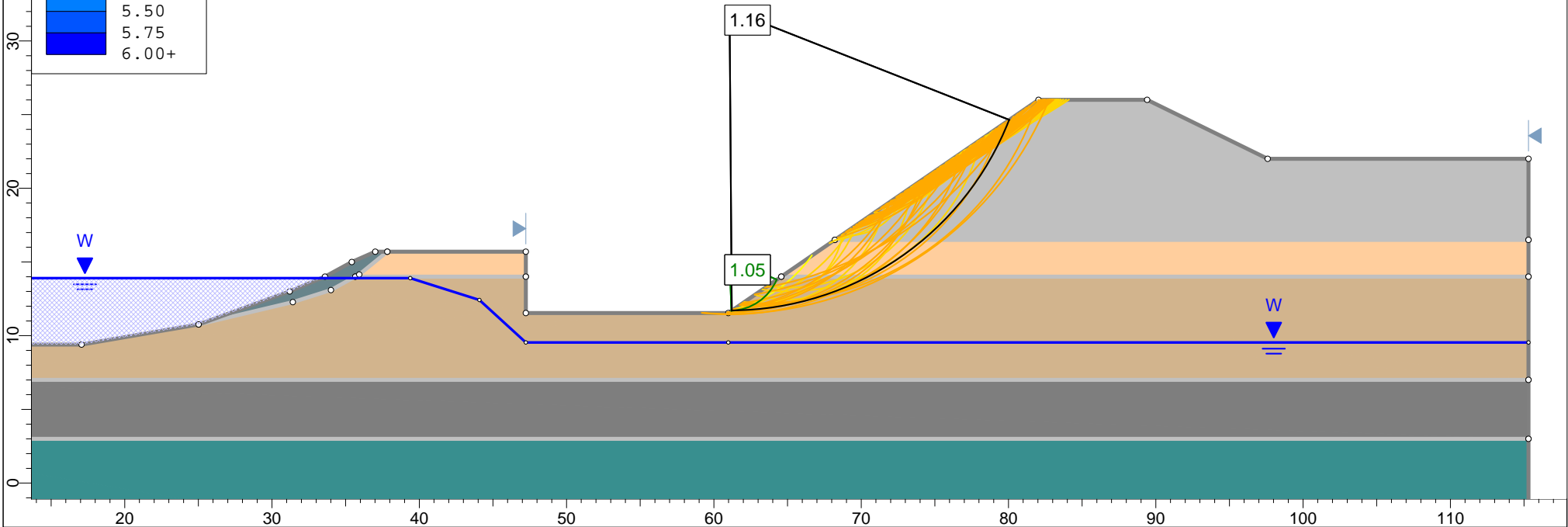
Material Name	Color	Unit Weight (lbs/ft <sup>3</sup> )	Strength Type	Cohesion (psf)	Phi (deg)	RD Envelope Type	RD Cr (psf)	RD PhiR (deg)
Berm Fill		130	Mohr-Coulomb	0	38	Total stress R linear	0.1	37
Sandy Silt		110	Mohr-Coulomb	50	31	Total stress R linear	200	30
Silt w/Sand / Silty Sand		112	Mohr-Coulomb	0	31	Total stress R linear	150	30
Silty Sandy Gravel		134	Mohr-Coulomb	0	38	Total stress R linear	0.1	37
Silt		115	Mohr-Coulomb	250	28	Total stress R linear	300	27
Crushed Rock		140	Mohr-Coulomb	0	45	Total stress R linear	0.1	44
Compacted Backfill		130	Mohr-Coulomb	25	34	Total stress R linear	50	33
RipRap		145	Mohr-Coulomb	0	40	Total stress R linear	0.1	40



<p><b>Northern, Inc.</b>          Consulting Engineers Environmental Scientists Geologists          Construction Materials Testing Geophysical Services</p>	Project			Yakima River Gateway Project								
	Analysis Description						Section D-D' - Post-Construction - Multi-Stage Rapid Drawdown (Static)					
	Drawn By			Scale			Company					
	KAH			1:150			GN Northern, Inc.					
Date			File Name			D-D' - WALLS - Rapid Drawdown.slim						

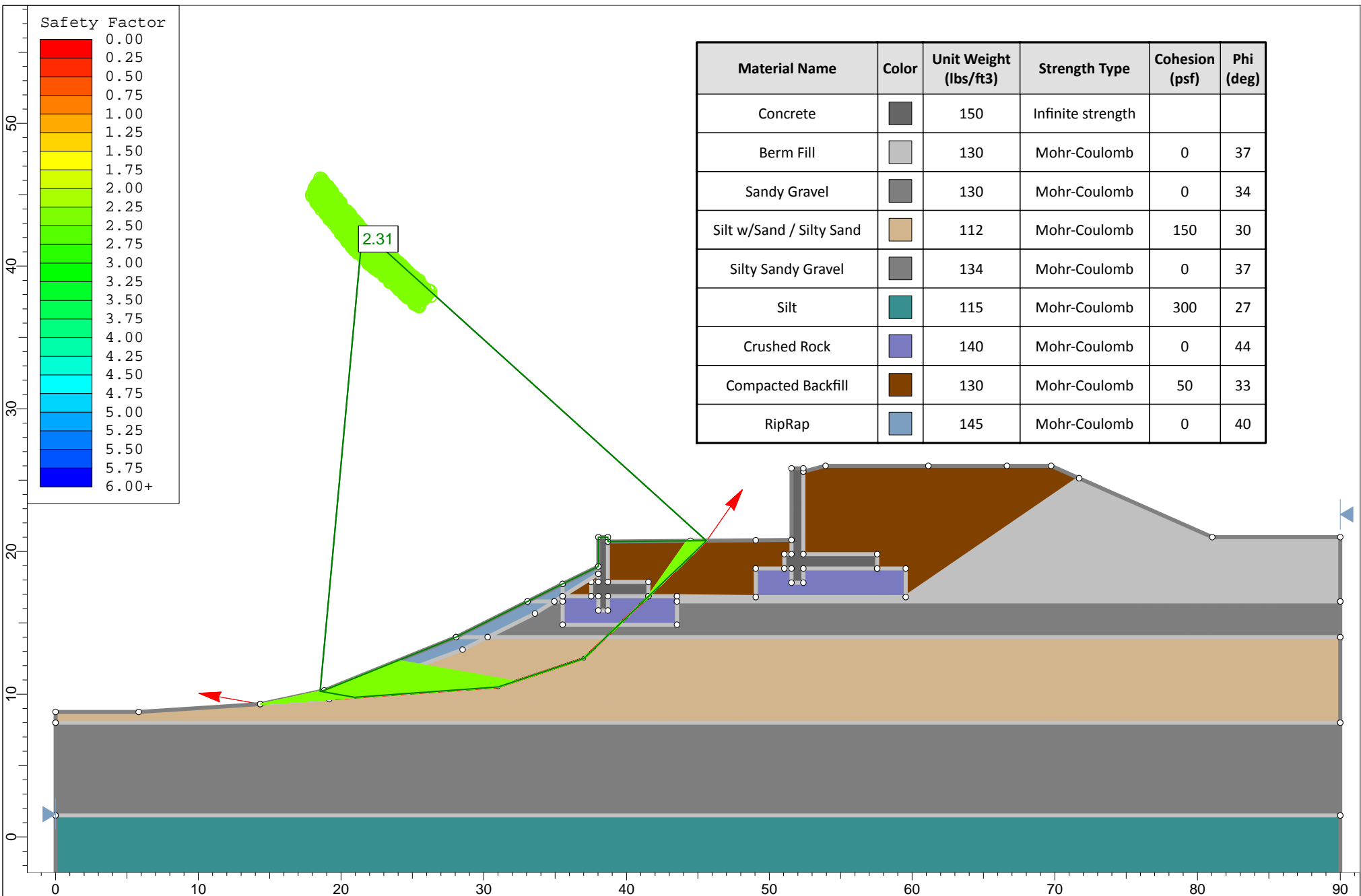


Material Name	Color	Unit Weight (lbs/ft <sup>3</sup> )	Strength Type	Cohesion (psf)
Berm Fill	Grey	130	Mohr-Coulomb	0
Sandy Silt	Light Orange	110	Mohr-Coulomb	50
Silt w/Sand / Silty Sand	Light Brown	112	Mohr-Coulomb	0
Silty Sandy Gravel	Dark Grey	134	Mohr-Coulomb	0
Silt	Teal	115	Mohr-Coulomb	250
RipRap	Dark Blue-Teal	145	Mohr-Coulomb	0



<p><b>Northern, Inc.</b>          Consulting Engineers Environmental Scientists Geologists          Construction Materials Testing Geophysical Services</p>	Project			Yakima River Gateway Project		
	Analysis Description			Section D-D' - During Construction - 1.5H:1V Temporary Cut Slope		
	Drawn By	KAH	Scale	1:121	Company	GN Northern, Inc.
	Date		File Name	D-D' - Temp Cut.slim		

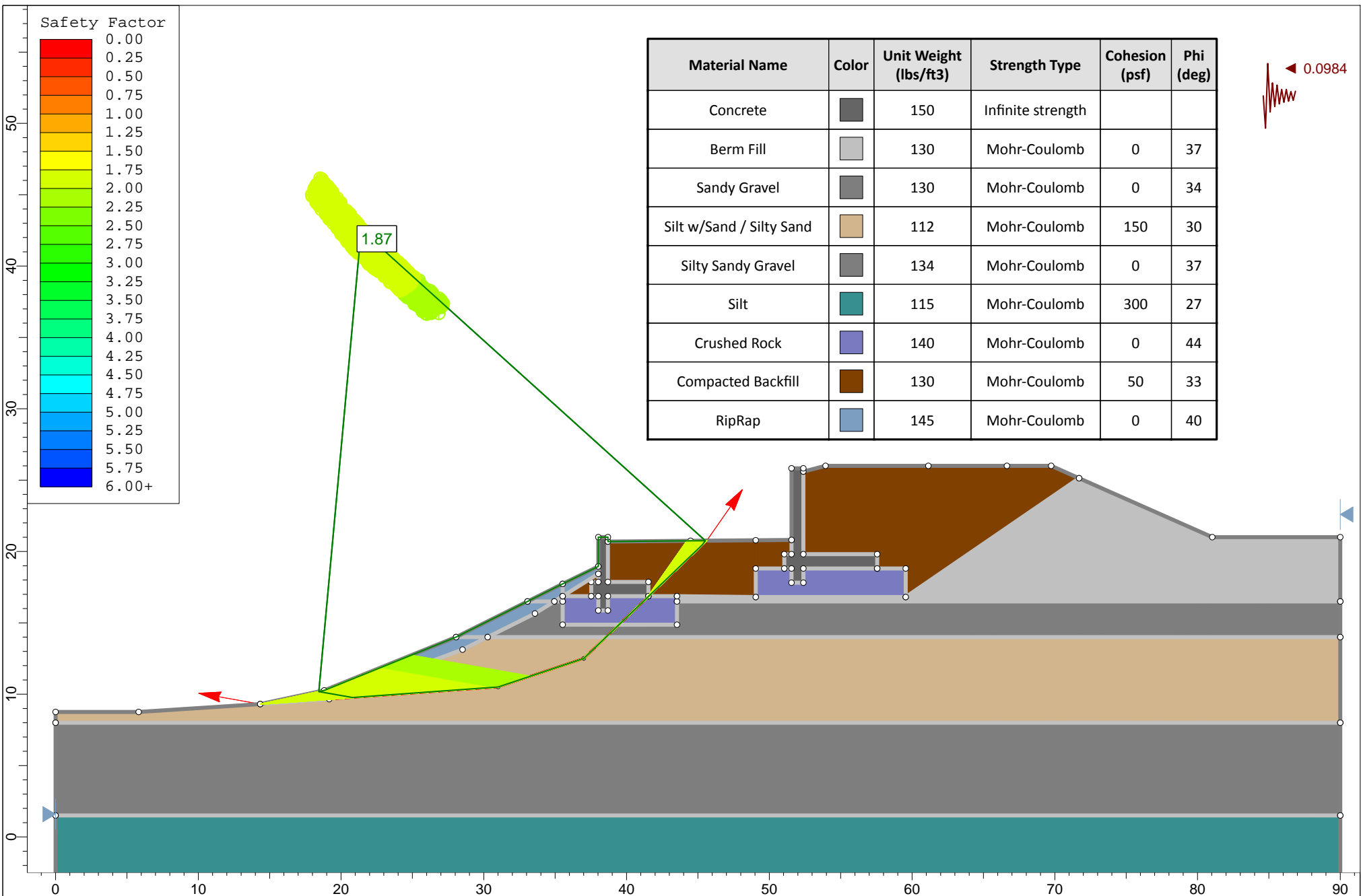
*Appendix II*  
*Non-Circular Slope Stability Analyses*



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 Construction Materials Testing Geophysical Services

Project			Yakima River Gateway Project		
Analysis Description			Section A-A' - End of Construction (Static)		
Drawn By	KAH	Scale	1:109	Company	GN Northern, Inc.
Date		File Name	A-A' - WALLS - End of Construction.slim		

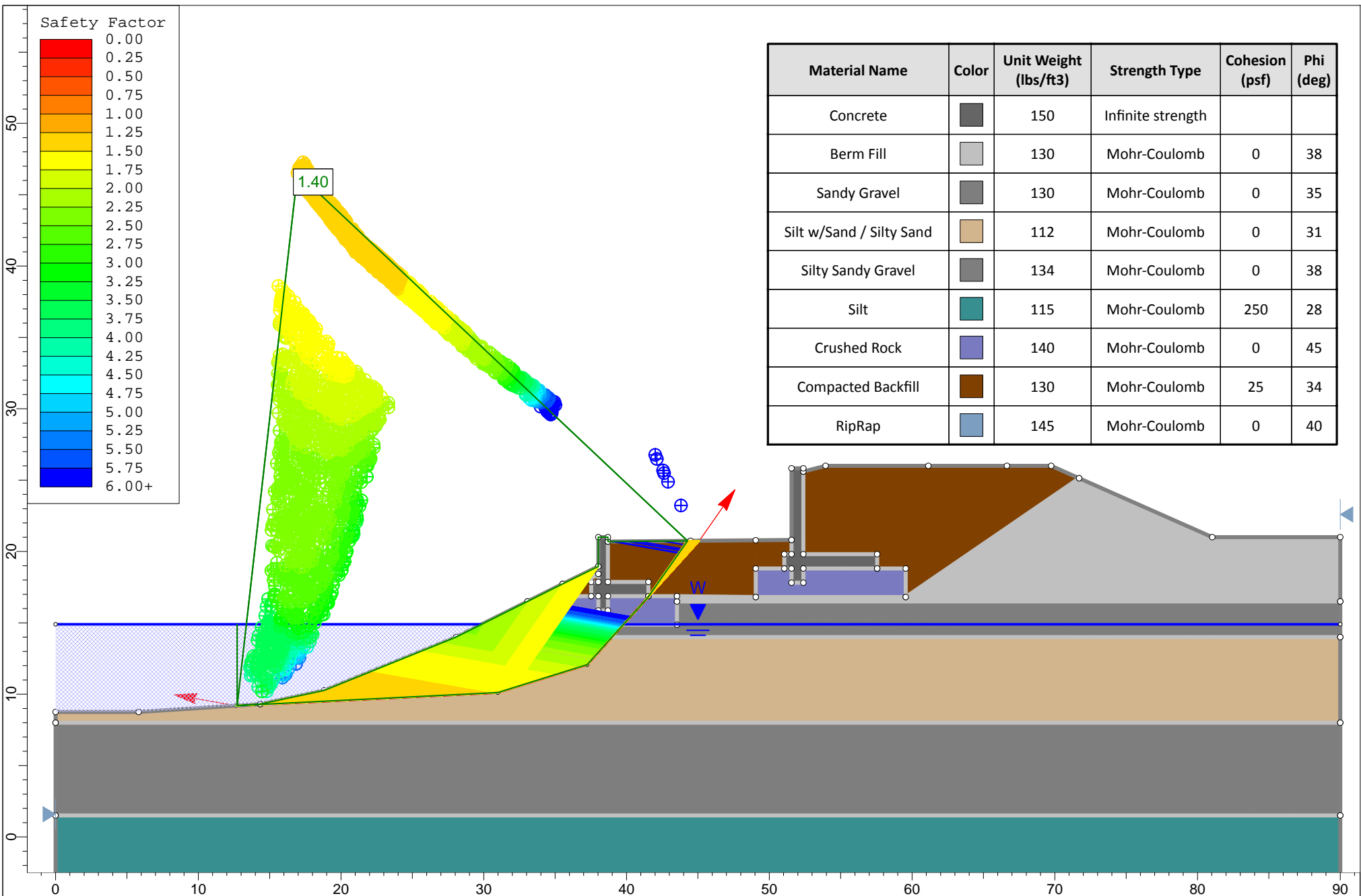




Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Concrete	Grey	150	Infinite strength		
Berm Fill	Light Grey	130	Mohr-Coulomb	0	37
Sandy Gravel	Dark Grey	130	Mohr-Coulomb	0	34
Silt w/Sand / Silty Sand	Tan	112	Mohr-Coulomb	150	30
Silty Sandy Gravel	Medium Grey	134	Mohr-Coulomb	0	37
Silt	Teal	115	Mohr-Coulomb	300	27
Crushed Rock	Purple	140	Mohr-Coulomb	0	44
Compacted Backfill	Brown	130	Mohr-Coulomb	50	33
RipRap	Blue-Gray	145	Mohr-Coulomb	0	40

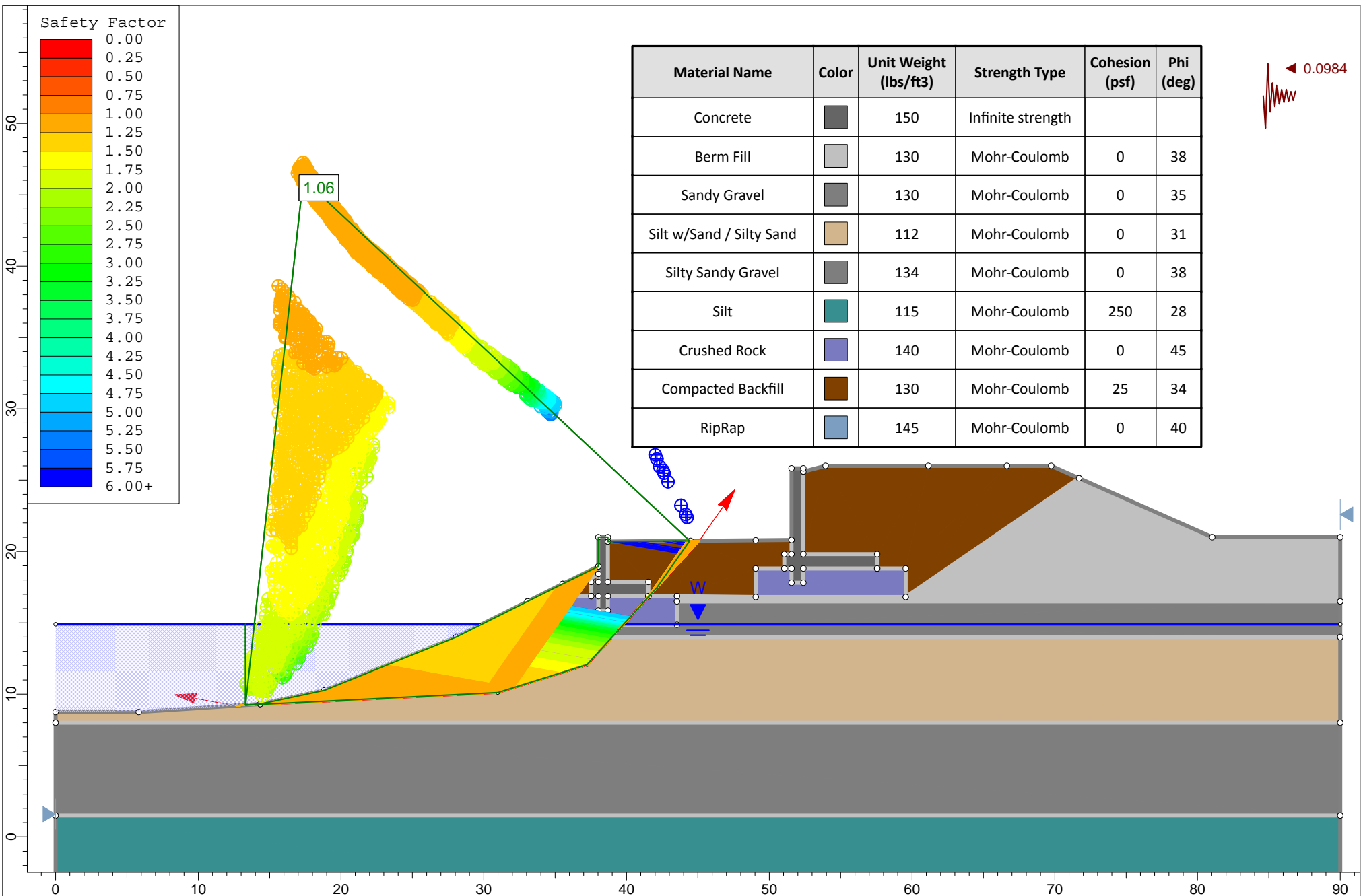
**Northern, Inc.**  
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 Construction Materials Testing Geophysical Services

Project				Yakima River Gateway Project	
Analysis Description				Section A-A' - End of Construction (Seismic)	
Drawn By	KAH	Scale	1:109	Company	GN Northern, Inc.
Date		File Name	A-A' - WALLS - End of Construction (seismic).slm		



**Northern, Inc.**  
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 Construction Materials Testing Geophysical Services

Project		Yakima River Gateway Project	
Analysis Description		Section A-A' - Post Construction - Steady-Stage Seepage @ OHWE (Static)	
Drawn By	KAH	Scale	1:109
Date		Company	GN Northern, Inc.
		File Name	A-A' - WALLS - Steady Seepage - OHWE.slim



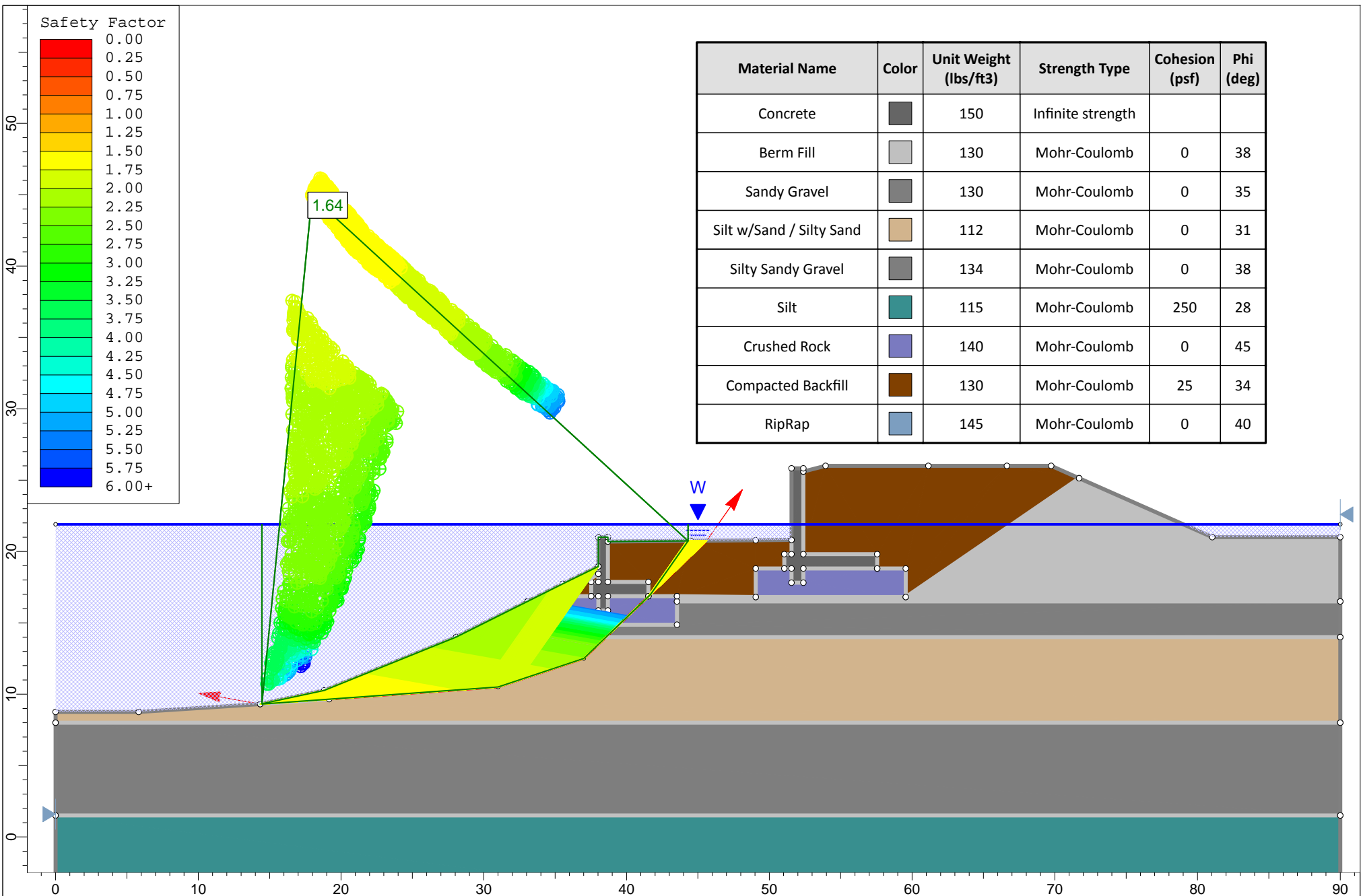
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Concrete	Dark Grey	150	Infinite strength		
Berm Fill	Light Grey	130	Mohr-Coulomb	0	38
Sandy Gravel	Dark Grey	130	Mohr-Coulomb	0	35
Silt w/Sand / Silty Sand	Tan	112	Mohr-Coulomb	0	31
Silty Sandy Gravel	Dark Grey	134	Mohr-Coulomb	0	38
Silt	Teal	115	Mohr-Coulomb	250	28
Crushed Rock	Purple	140	Mohr-Coulomb	0	45
Compacted Backfill	Brown	130	Mohr-Coulomb	25	34
RipRap	Blue	145	Mohr-Coulomb	0	40


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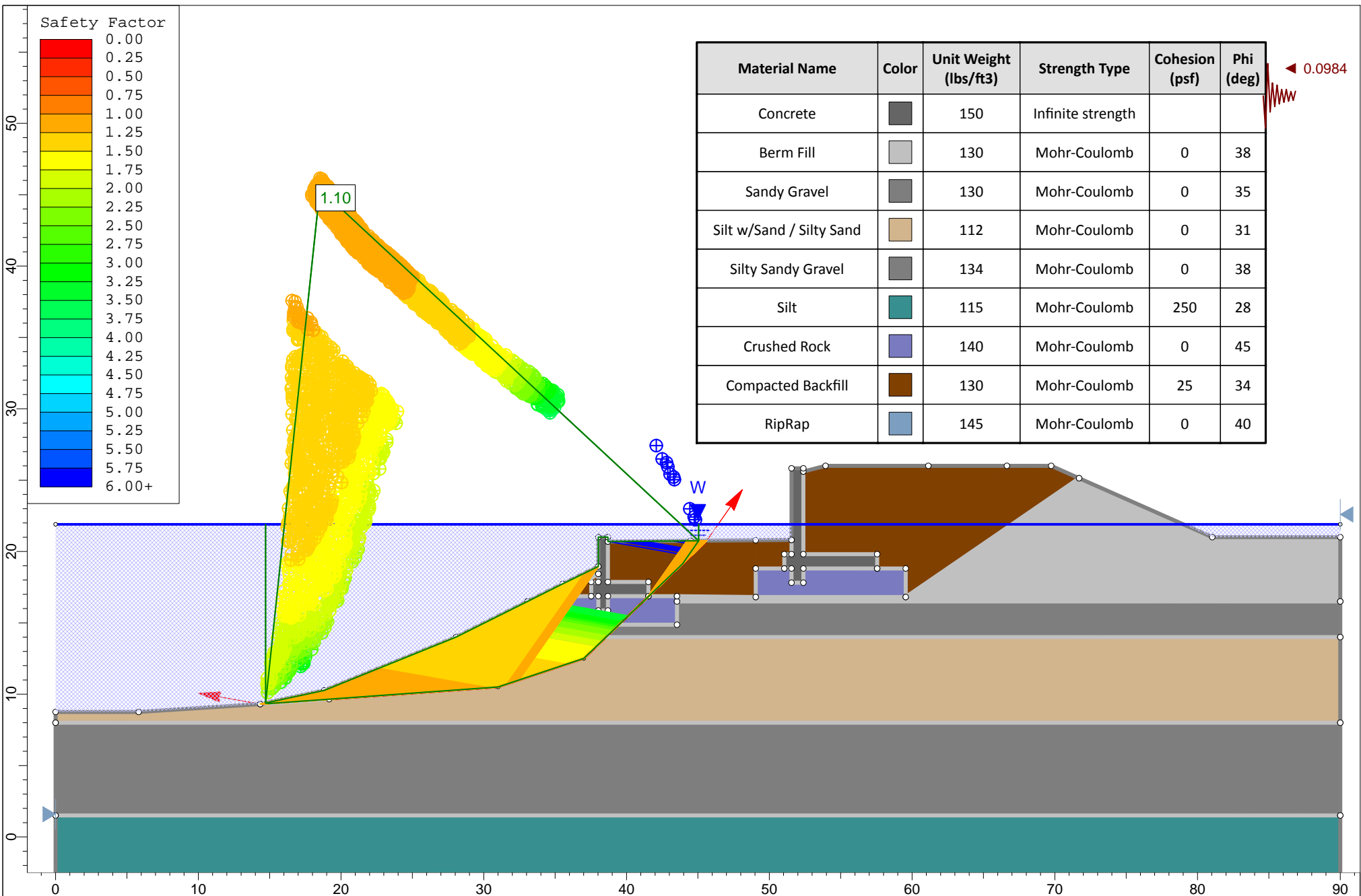



SLIDEINTERPRET 6.037

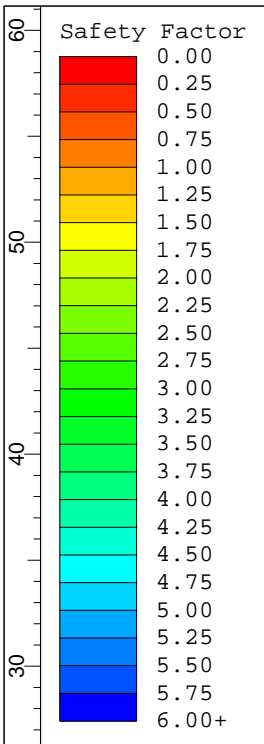
Project			Yakima River Gateway Project		
Analysis Description			Section A-A' - Post Construction - Steady-Stage Seepage @ OHWE (Seismic)		
Drawn By	KAH	Scale	1:109	Company	GN Northern, Inc.
Date		File Name	A-A' - WALLS - Steady Seepage - OHWE (seismic).slim		



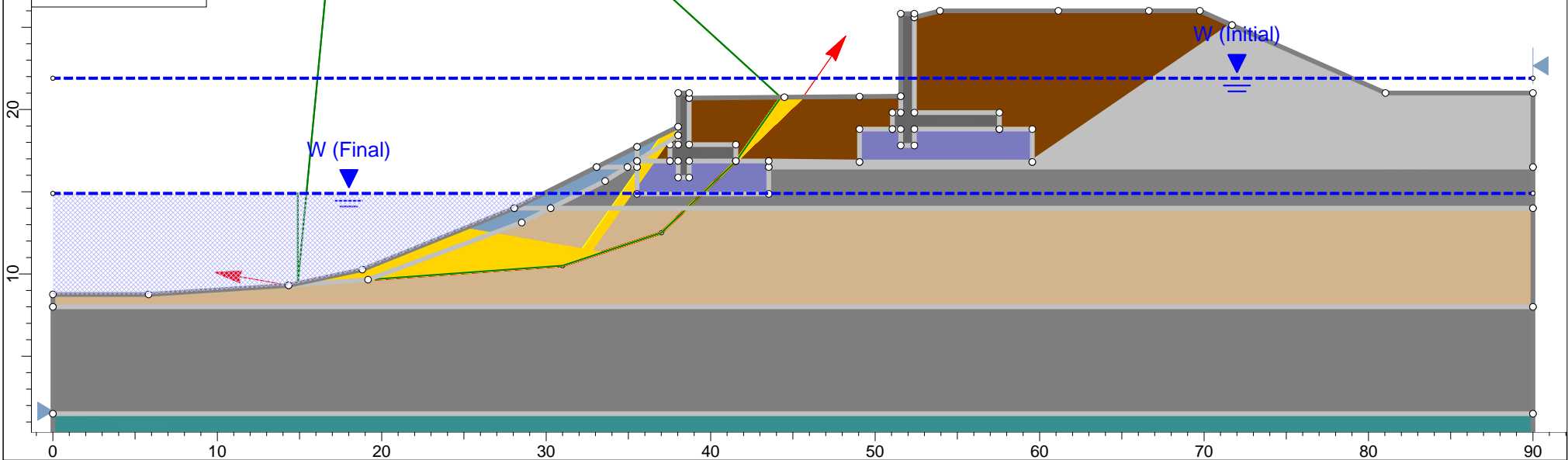
 <p><b>Northern, Inc.</b>  <small>Consulting Engineers Environmental Scientists Geologists  Construction Materials Testing Geophysical Services</small></p>	Project		
	Yakima River Gateway Project		
	Analysis Description		
	Section A-A' - Post Construction - Steady-State Seepage @ DFE (Static)		
Drawn By	KAH	Scale	1:109
Date		Company	GN Northern, Inc.
		File Name	A-A' - WALLS - Steady Seepage - DFE.slim



 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project			Yakima River Gateway Project		
	Analysis Description			Section A-A' - Post Construction - Steady-State Seepage @ DFE (Seismic)		
	Drawn By	KAH	Scale	1:109	Company	GN Northern, Inc.
	Date		File Name	A-A' - WALLS - Steady Seepage - DFE (seismic).slim		

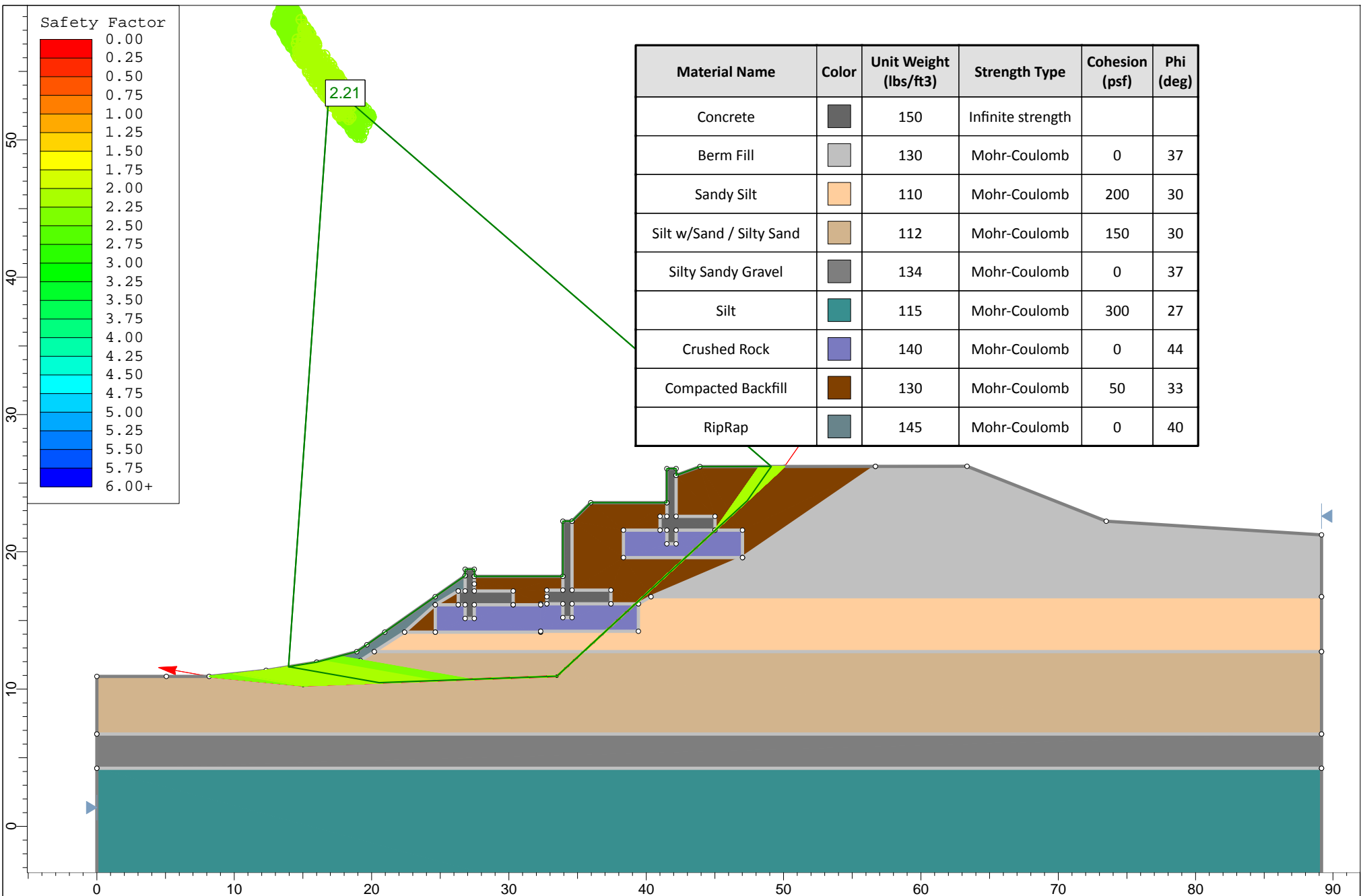



Material Name	Color	Unit Weight (lbs/ft <sup>3</sup> )	Strength Type	Cohesion (psf)	Phi (deg)	RD Envelope Type	RD Cr (psf)	RD PhiR (deg)
Berm Fill		130	Mohr-Coulomb	0	38	Total stress R linear	0.1	37
Sandy Gravel		130	Mohr-Coulomb	0	35	Total stress R linear	0.1	34
Silt w/Sand / Silty Sand		112	Mohr-Coulomb	0	31	Total stress R linear	150	30
Silty Sandy Gravel		134	Mohr-Coulomb	0	38	Total stress R linear	0.1	37
Silt		115	Mohr-Coulomb	250	28	Total stress R linear	300	27
Crushed Rock		140	Mohr-Coulomb	0	45	Total stress R linear	0.1	43
Compacted Backfill		130	Mohr-Coulomb	25	34	Total stress R linear	50	33
RipRap		145	Mohr-Coulomb	0	40	Total stress R linear	0.1	40

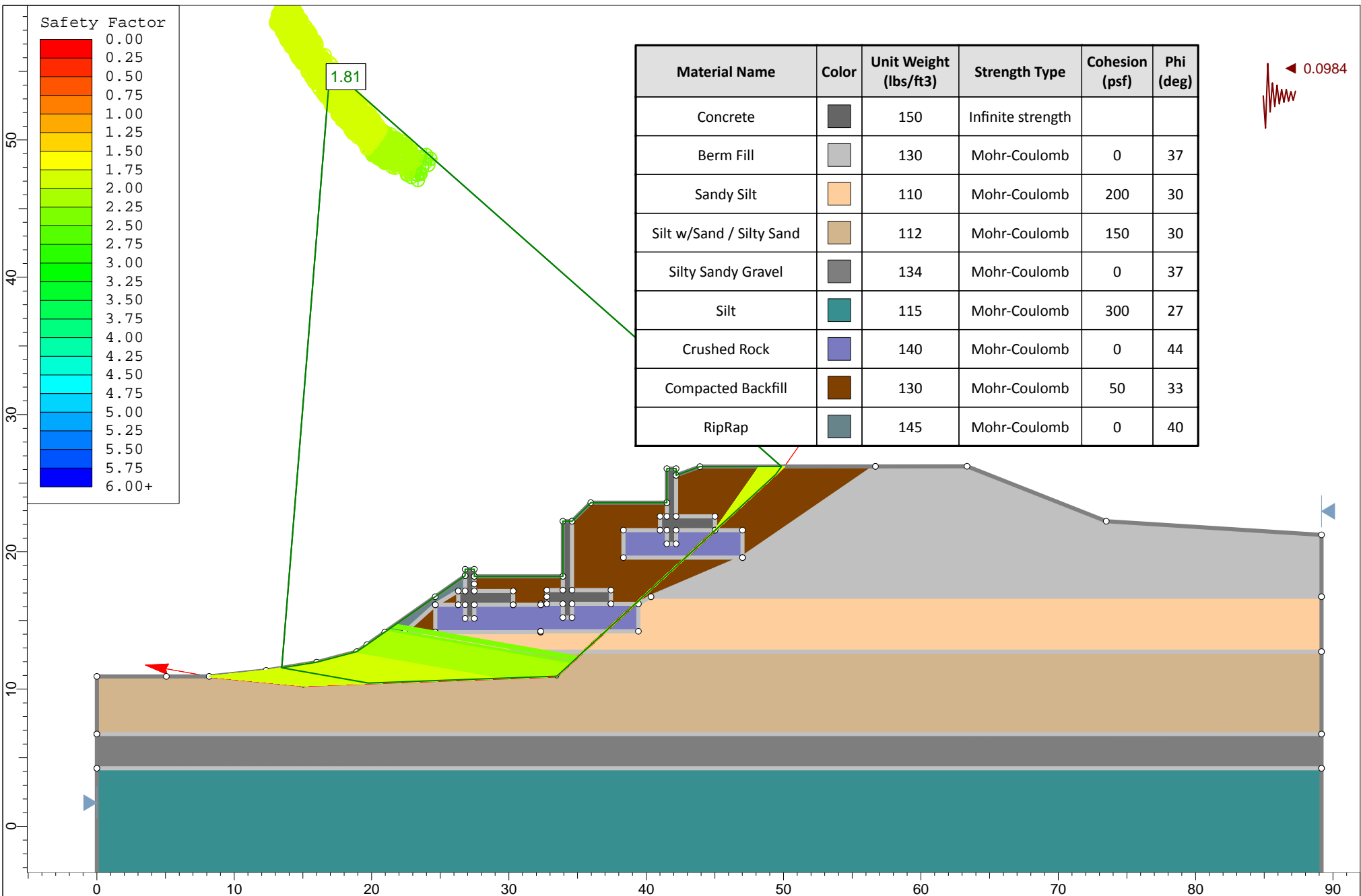


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Project				Yakima River Gateway Project			
Analysis Description				Section A-A' - Post Construction - Multi-Stage Rapid Drawdown (Static)			
Drawn By		KAH		Scale		1:109	
Date				Company		GN Northern, Inc.	
				File Name		A-A' - WALLS - Rapid Drawdown.slim	



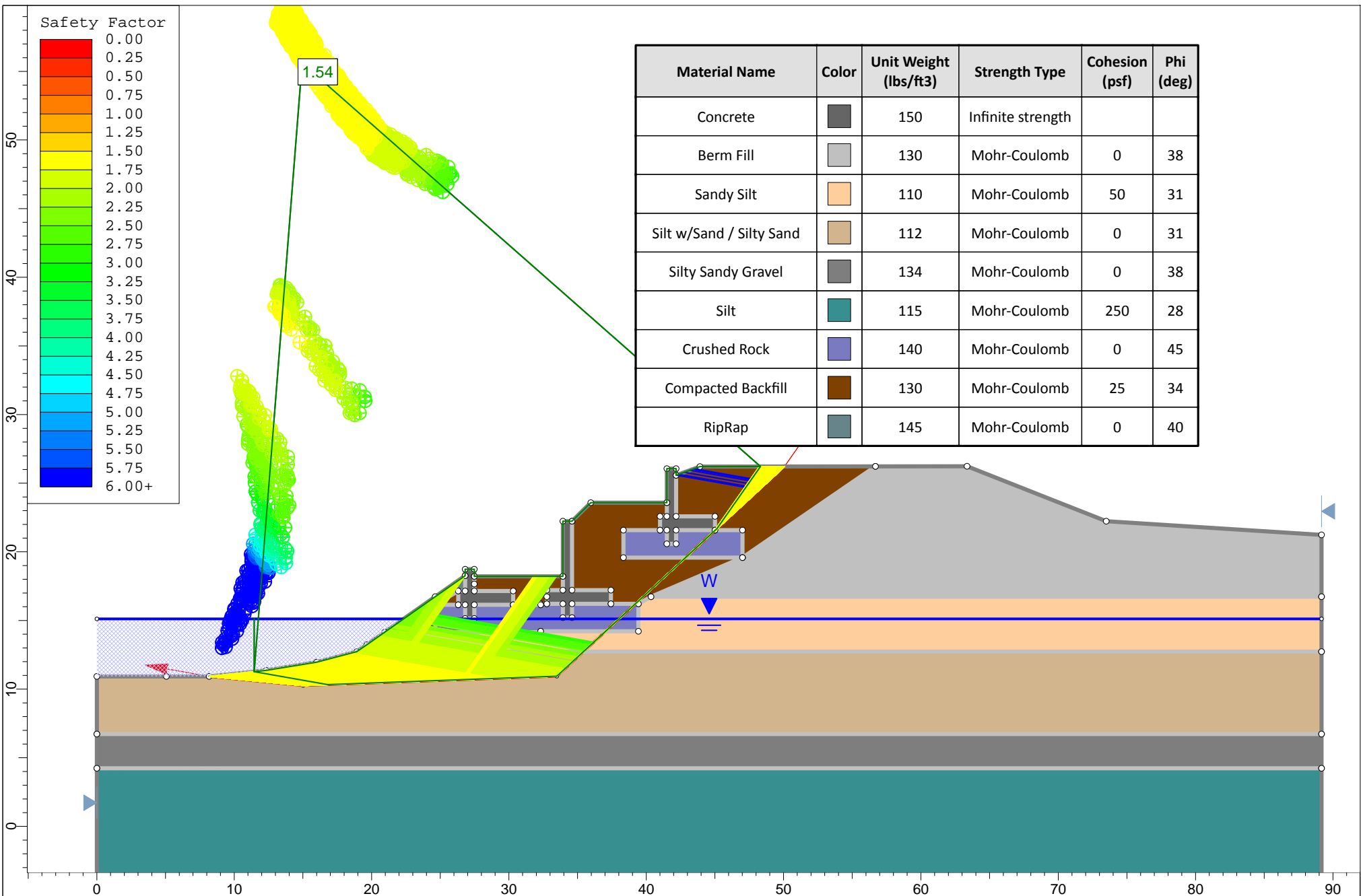
 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project			Yakima River Gateway Project		
	Analysis Description			Section C-C' - End of Construction (Static)		
	Drawn By	KAH	Scale	1:113	Company	GN Northern, Inc.
	Date		File Name	C-C' - WALLS - End of Construction.slim		




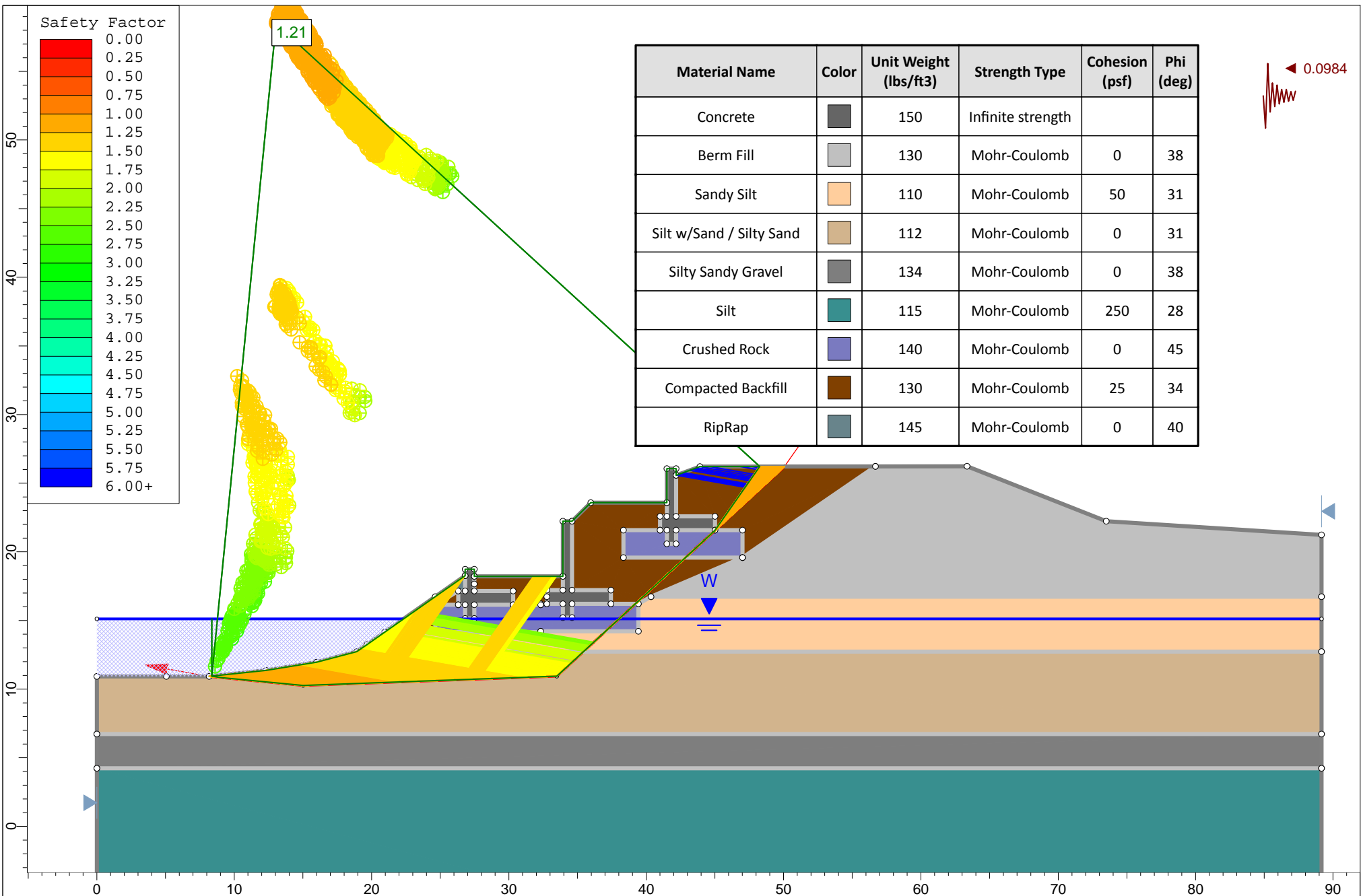
**Northern, Inc.**  
 Consulting Engineers Environmental Scientists Geologists  
 Construction Materials Testing Geophysical Services

Project			Yakima River Gateway Project		
Analysis Description			Section C-C' - End of Construction (Seismic)		
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Date		File Name	C-C' - WALLS - End of Construction (seismic).slm		





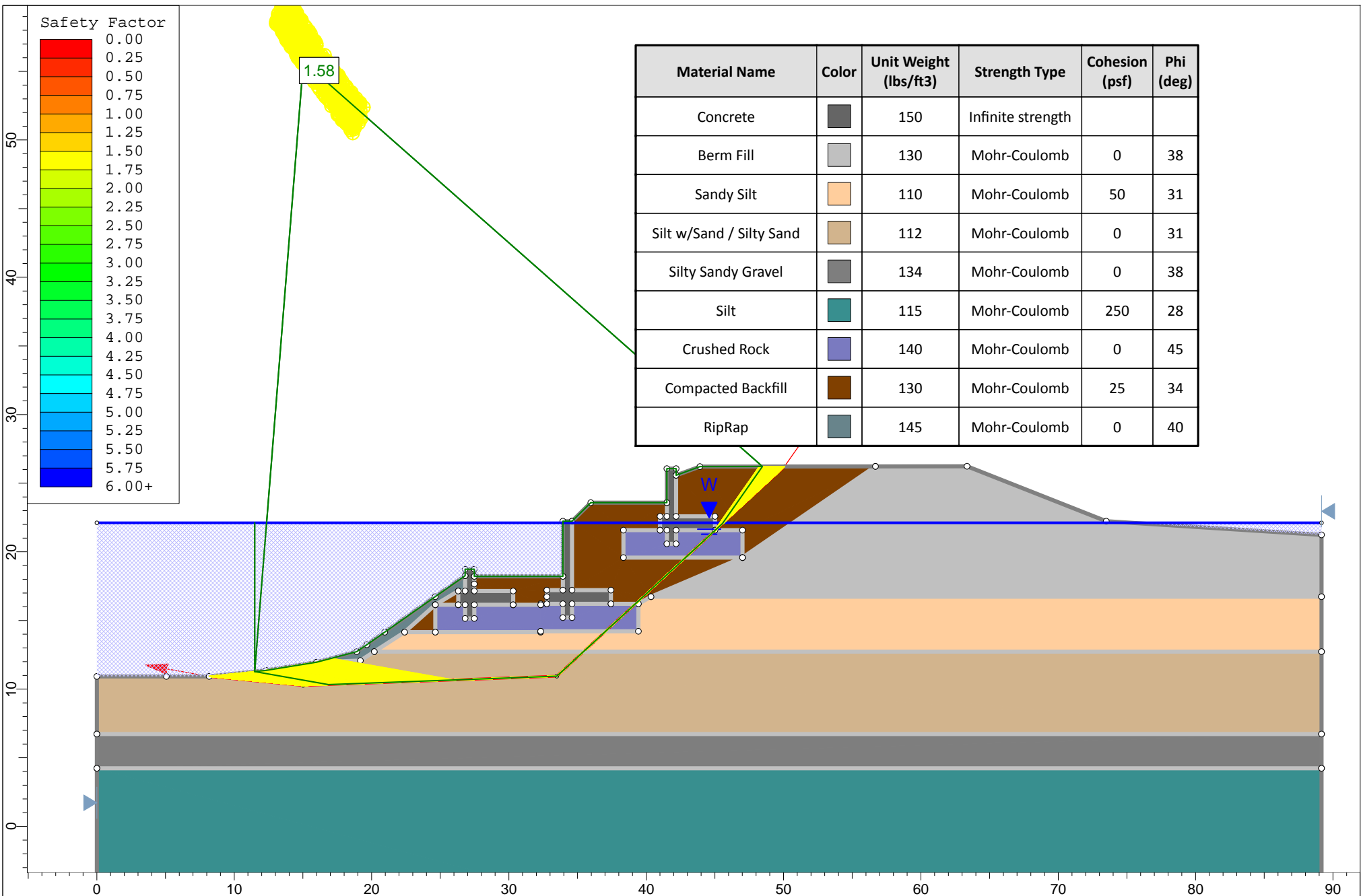
 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project			Yakima River Gateway Project		
	Analysis Description			Section C-C' - Post-Construction - Steady-State Seepage @ OHWE (Static)		
	Drawn By	KAH	Scale	1:113	Company	GN Northern, Inc.
	Date		File Name	C-C' - WALLS - Steady Seepage - OHWE.slim		
	SLIDEINTERPRET 6.037					




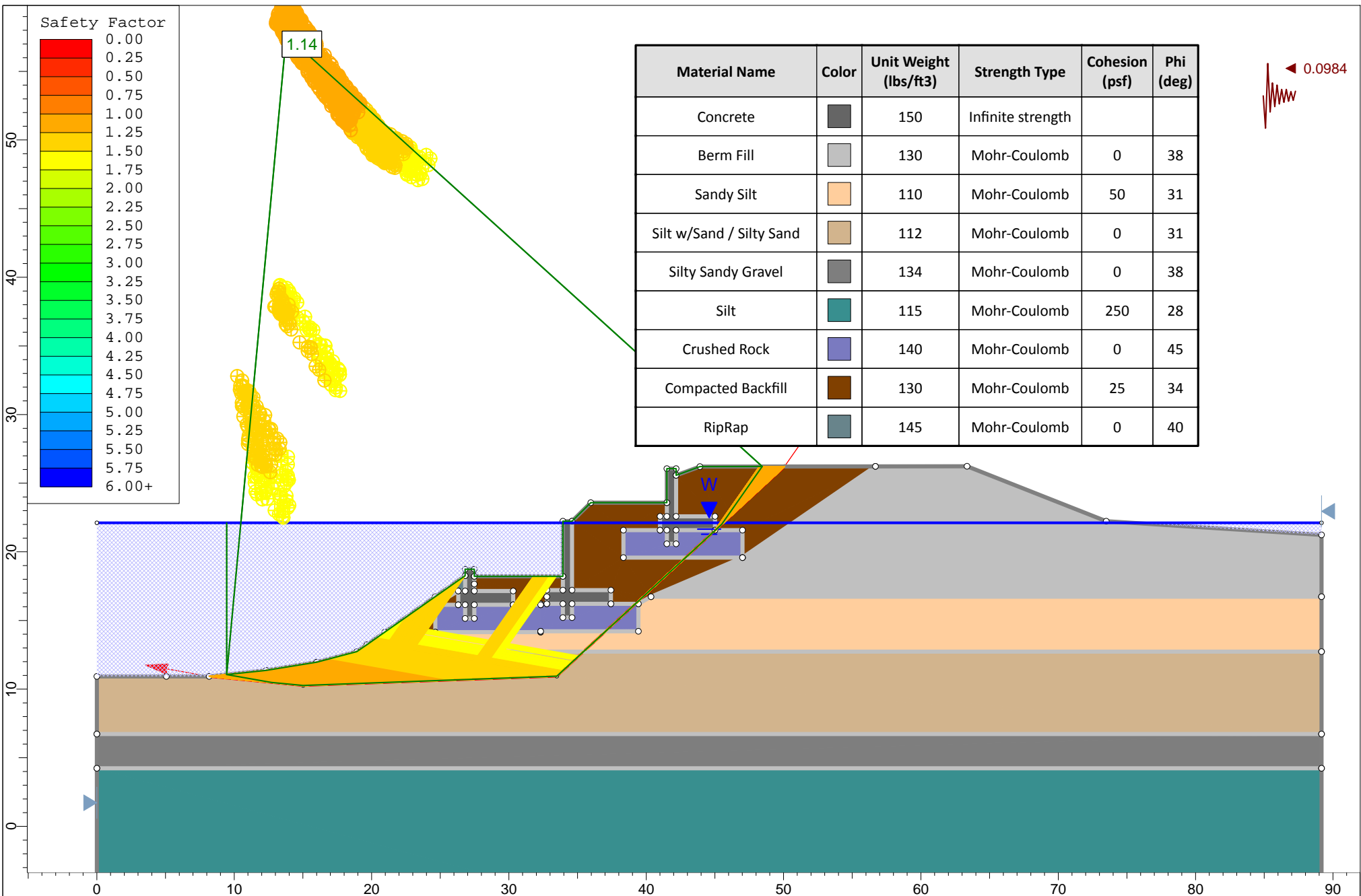
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Concrete	Dark Grey	150	Infinite strength		
Berm Fill	Light Grey	130	Mohr-Coulomb	0	38
Sandy Silt	Light Orange	110	Mohr-Coulomb	50	31
Silt w/Sand / Silty Sand	Light Brown	112	Mohr-Coulomb	0	31
Silty Sandy Gravel	Dark Grey	134	Mohr-Coulomb	0	38
Silt	Teal	115	Mohr-Coulomb	250	28
Crushed Rock	Purple	140	Mohr-Coulomb	0	45
Compacted Backfill	Brown	130	Mohr-Coulomb	25	34
RipRap	Blue-Gray	145	Mohr-Coulomb	0	40


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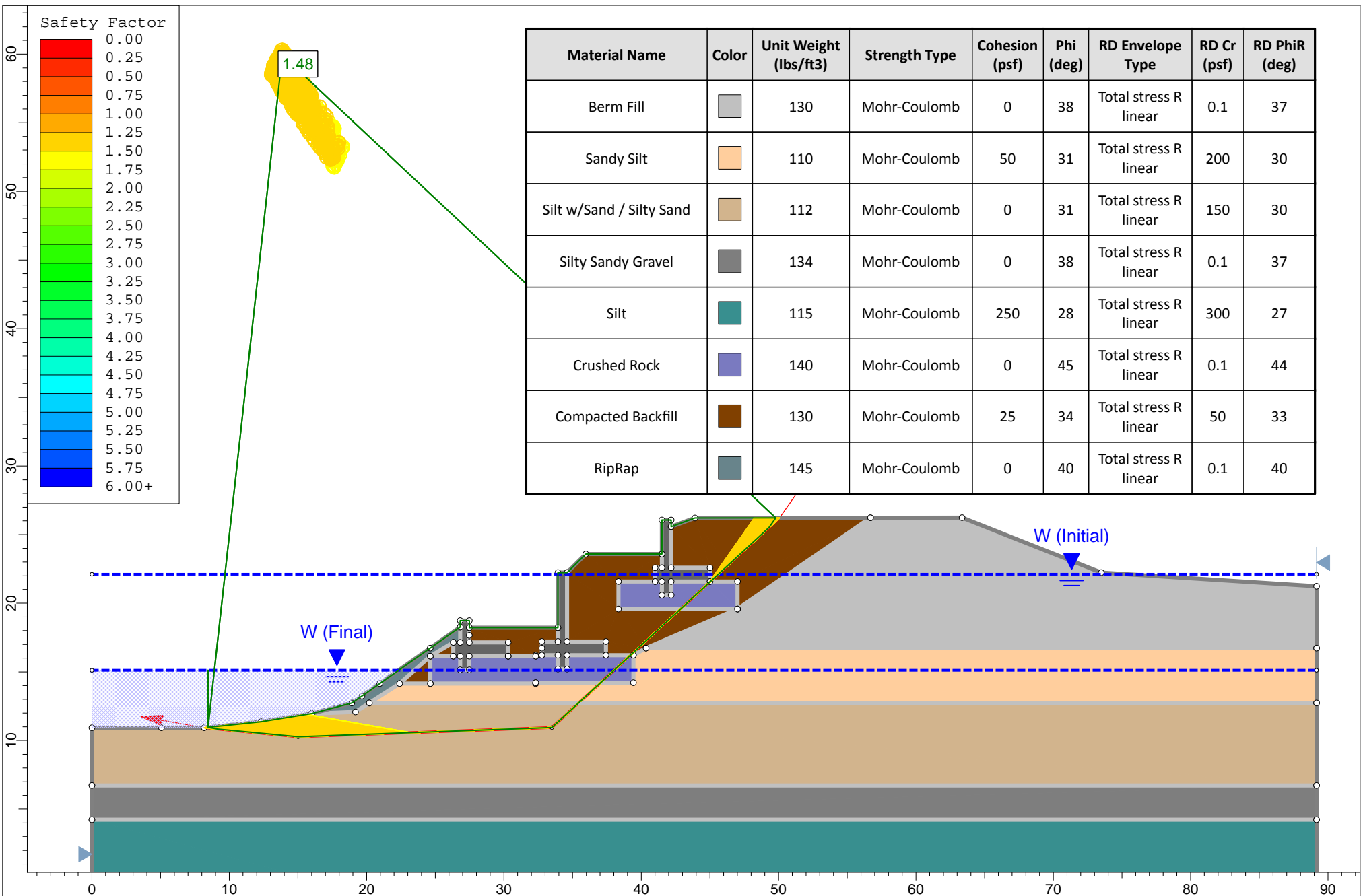
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Analysis Description			Section C-C' - Post-Construction - Steady-State Seepage @ OHWE (Seismic)		
Drawn By	KAH	Scale	1:113	Company	GN Northern, Inc.
Date		File Name	C-C' - WALLS - Steady Seepage - OHWE (seismic).slim		




 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project		
	Yakima River Gateway Project		
	Analysis Description		
	Section C-C' - Post-Construction - Steady-State Seepage @ DFE (Static)		
Drawn By	KAH	Scale	1:113
Date		Company	GN Northern, Inc.
		File Name	C-C' - WALLS - Steady Seepage - DFE.slim



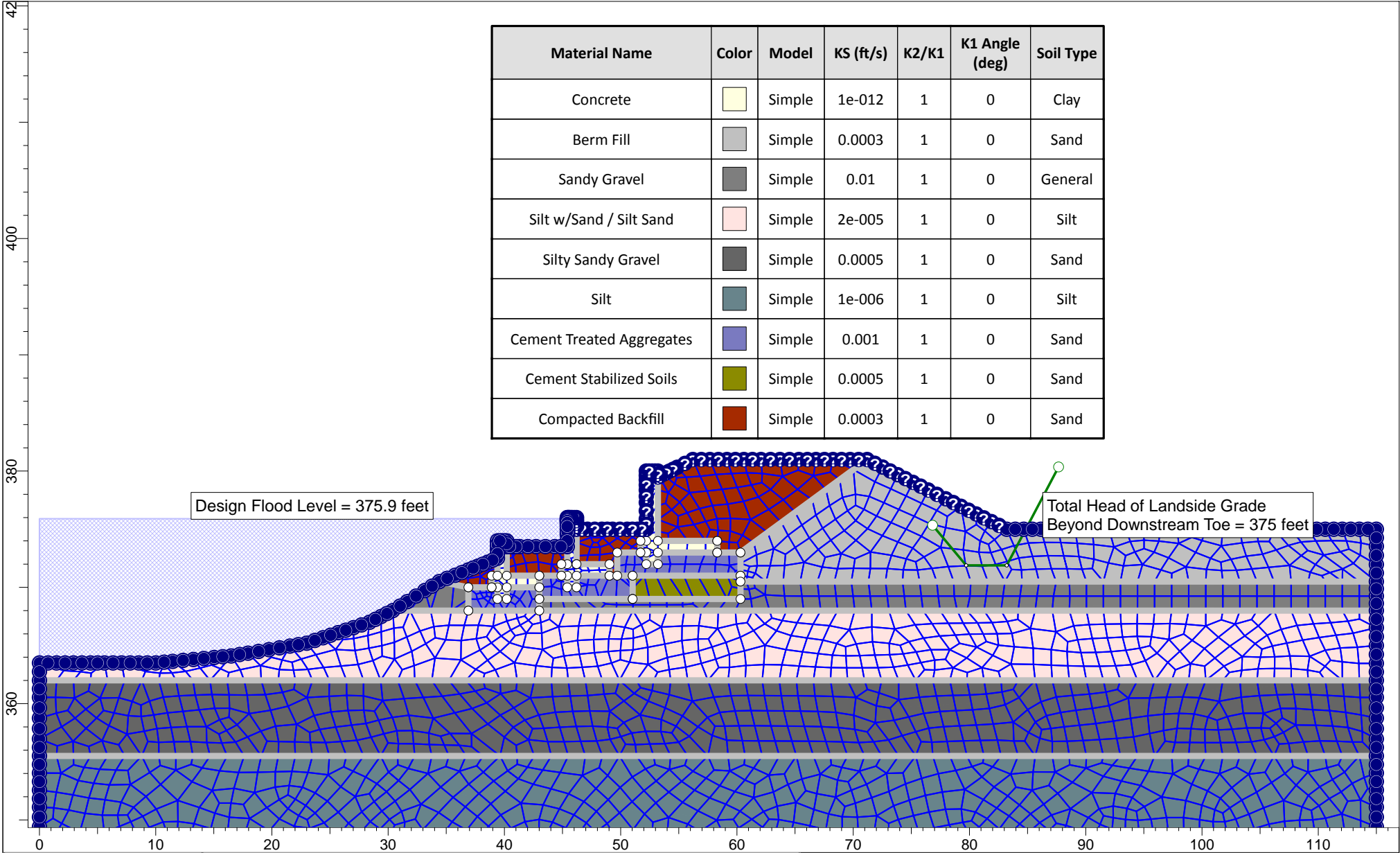
 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project			Yakima River Gateway Project		
	Analysis Description			Section C-C' - Post-Construction - Steady-State Seepage @ DFE (Seismic)		
	Drawn By	KAH	Scale	1:113	Company	GN Northern, Inc.
	Date		File Name	C-C' - WALLS - Steady Seepage - DFE (seismic).slim		



 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project		
	Yakima River Gateway Project		
	Analysis Description		
	Section C-C' - Post-Construction - Multi-Stage Rapid Drawdown (Static)		
Drawn By	KAH	Scale	1:113
Date		Company	GN Northern, Inc.
		File Name	C-C' - WALLS - Rapid Drawdown.slim

*Appendix III*  
*Finite Element Seepage Analyses*





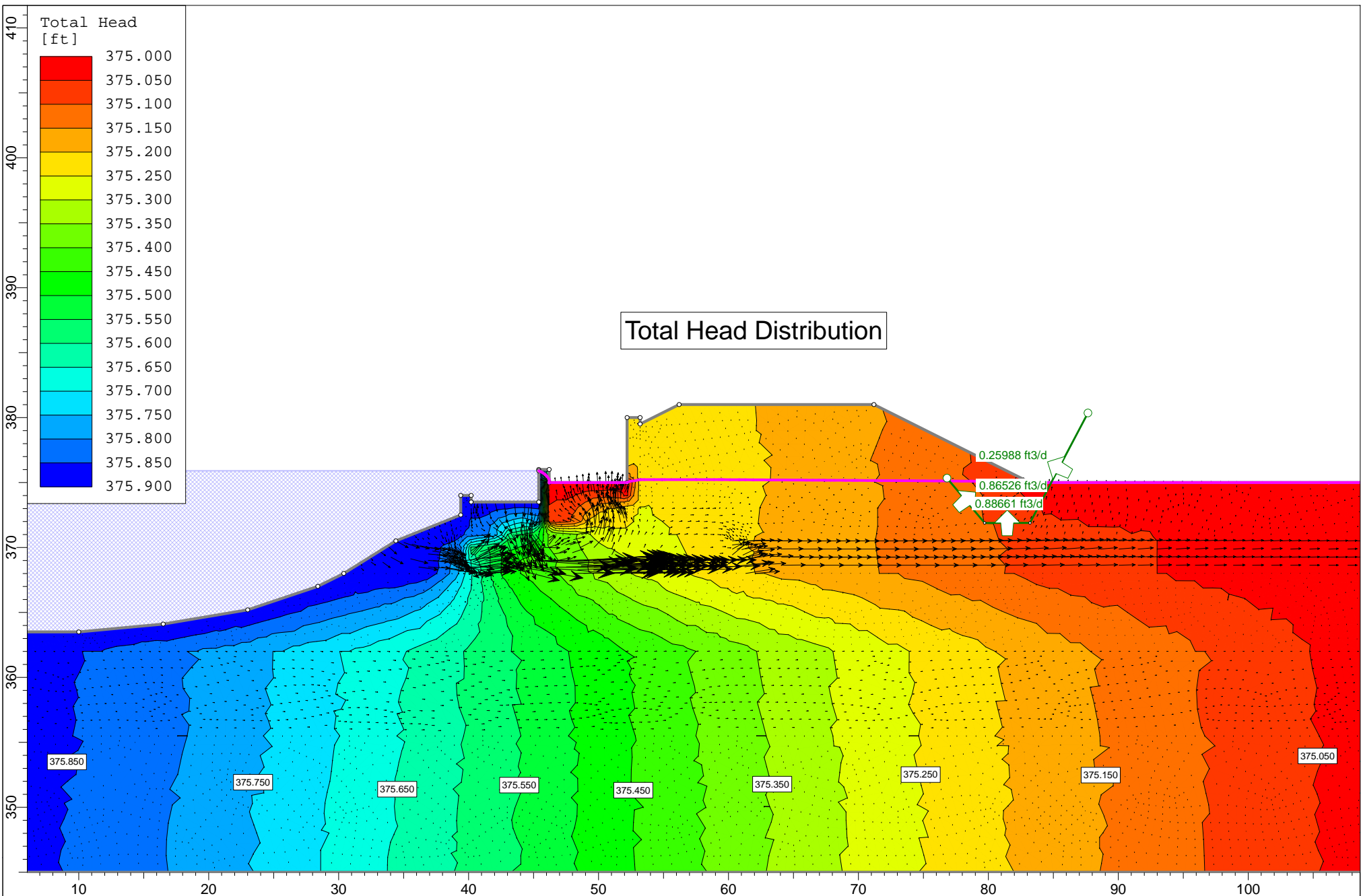
Material Name	Color	Model	KS (ft/s)	K2/K1	K1 Angle (deg)	Soil Type
Concrete		Simple	1e-012	1	0	Clay
Berm Fill		Simple	0.0003	1	0	Sand
Sandy Gravel		Simple	0.01	1	0	General
Silt w/Sand / Silt Sand		Simple	2e-005	1	0	Silt
Silty Sandy Gravel		Simple	0.0005	1	0	Sand
Silt		Simple	1e-006	1	0	Silt
Cement Treated Aggregates		Simple	0.001	1	0	Sand
Cement Stabilized Soils		Simple	0.0005	1	0	Sand
Compacted Backfill		Simple	0.0003	1	0	Sand


Design Flood Level = 375.9 feet

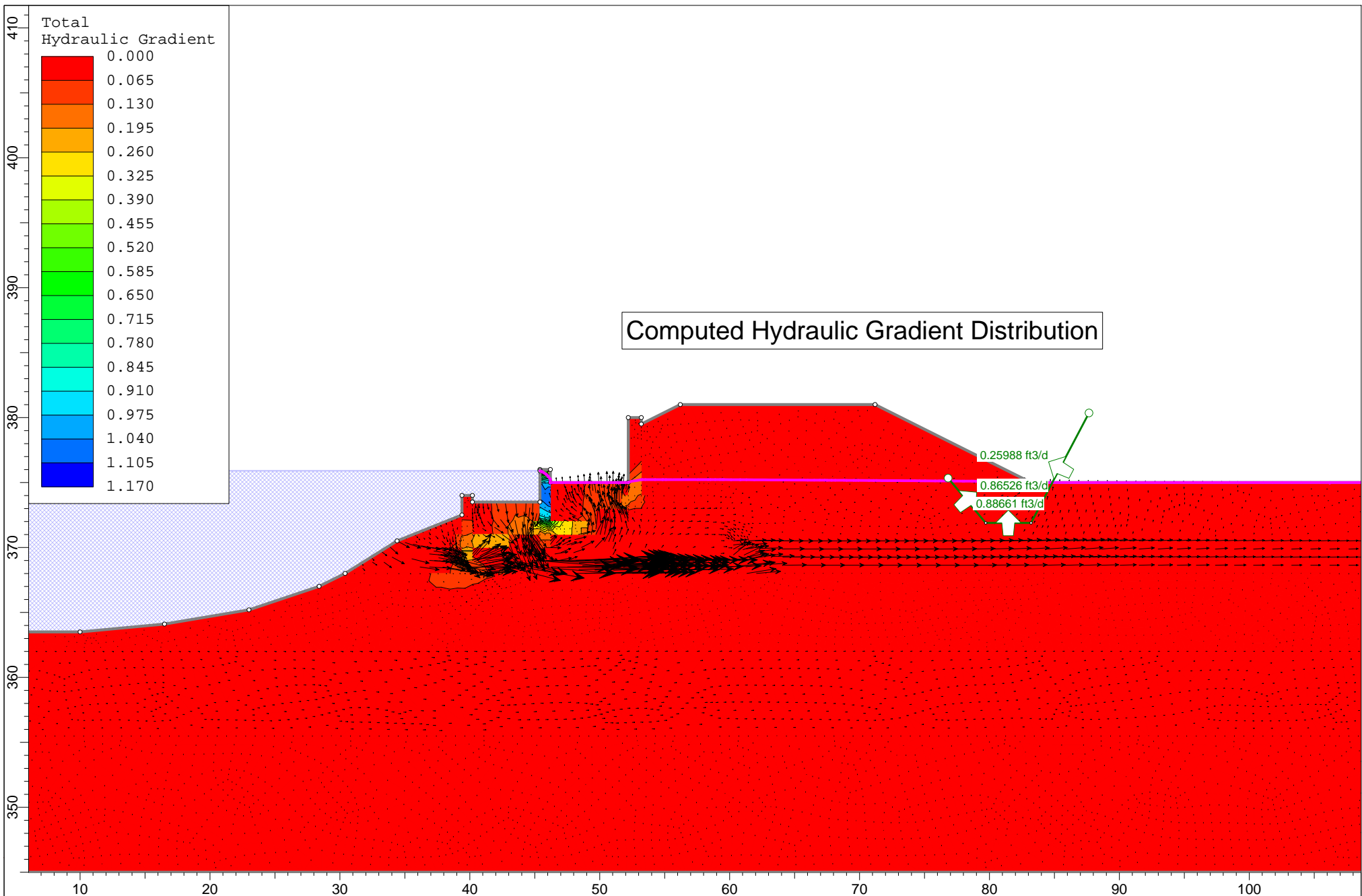
Total Head of Landside Grade Beyond Downstream Toe = 375 feet


	Project			Section A - Flood/Retaining Wall Seepage Analysis		
	Analysis Description			Finite Element Seepage Analysis		
	Drawn By	YL	Scale	1:137	Company	GN Northern, Inc.
	Date		File Name	Section-A_flow_MP1_simple.slim		












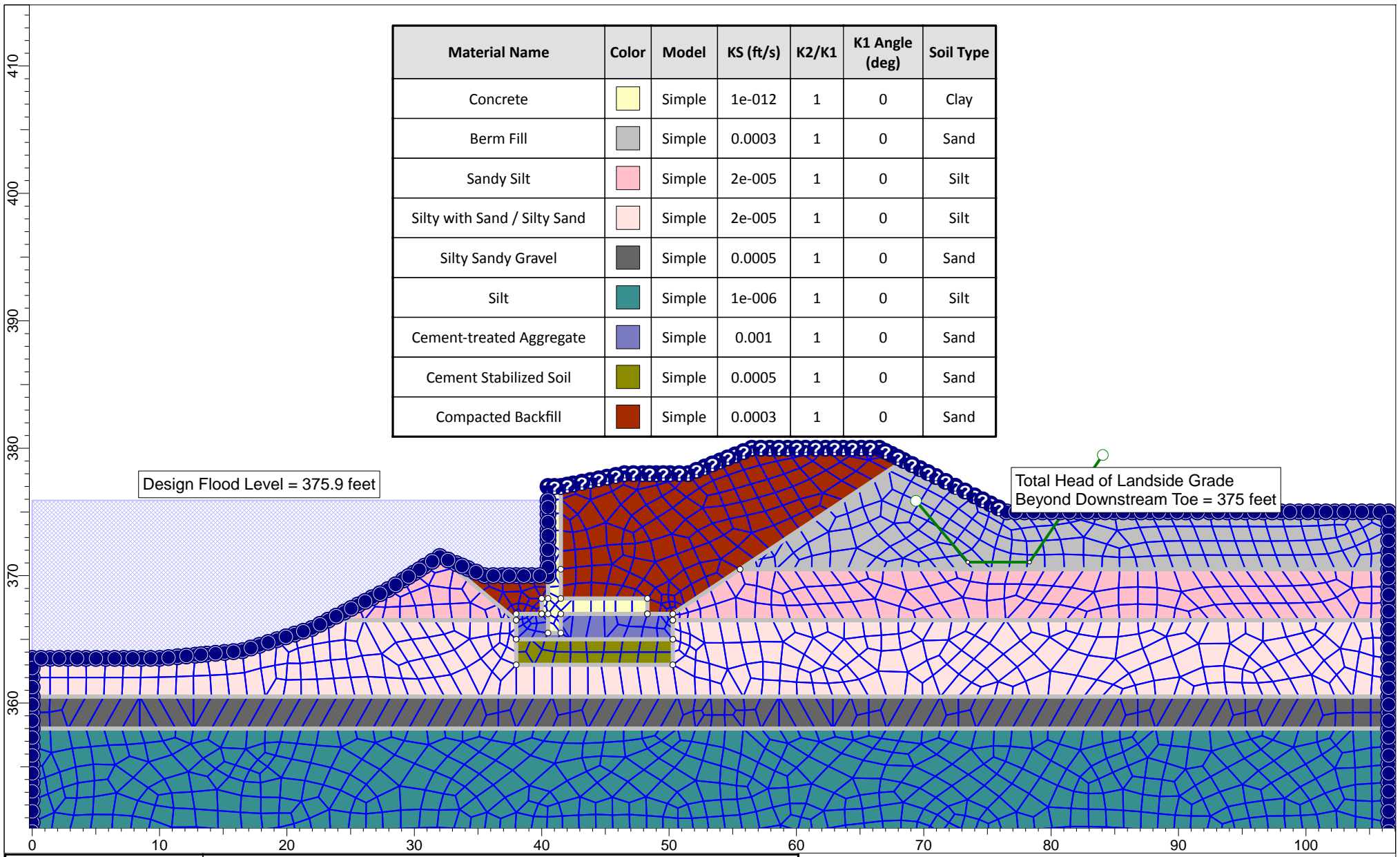



 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project			Section A - Flood/Retaining Wall Seepage Analysis		
	Analysis Description			Finite Element Seepage Analysis		
	Drawn By	YL	Scale	1:119	Company	GN Northern, Inc.
	Date		File Name	Section-A_flow_MP1_simple.slim		

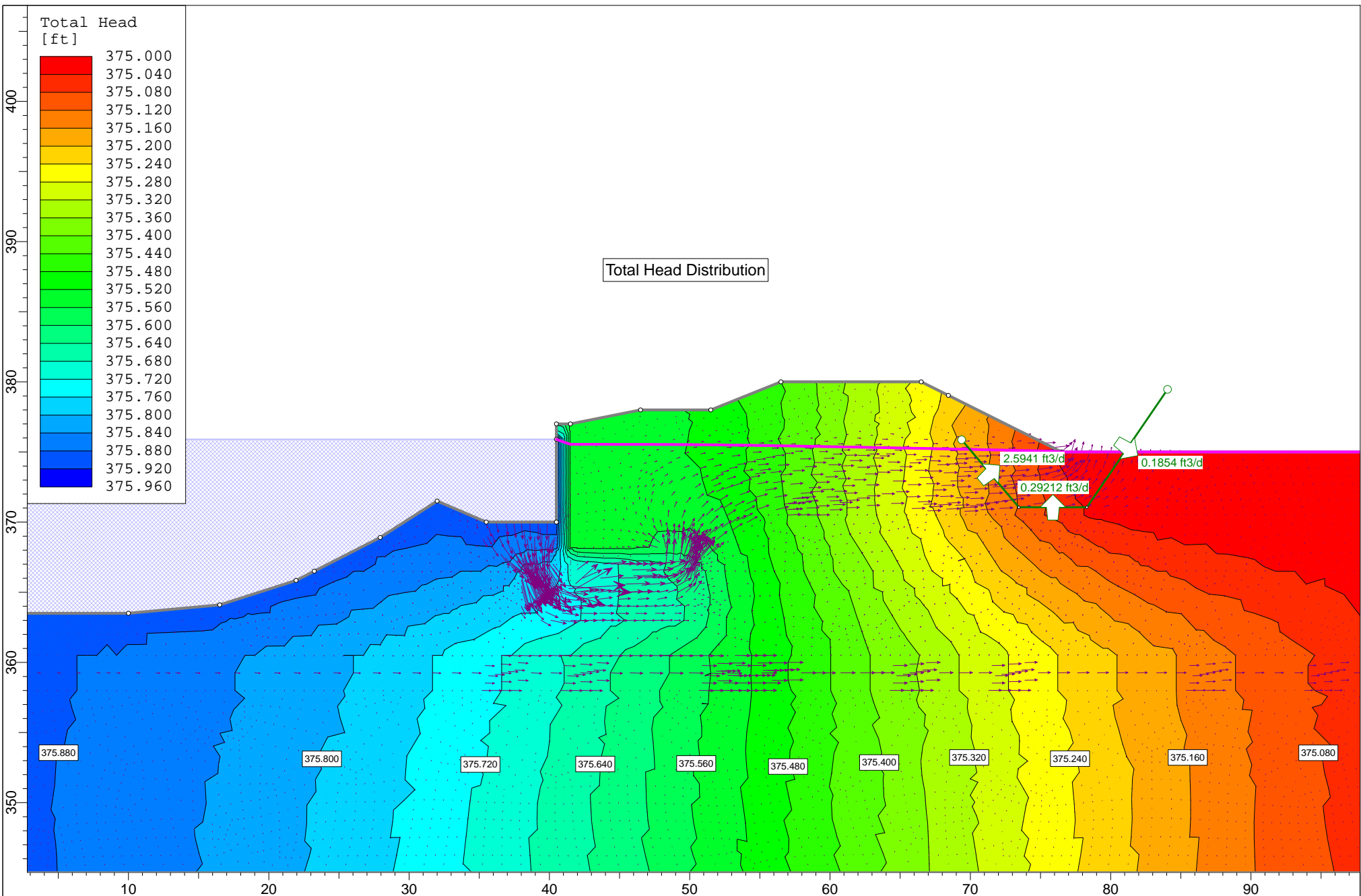



 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	<i>Project</i>		
	Section A - Flood/Retaining Wall Seepage Analysis		
	<i>Analysis Description</i>		
	Finite Element Seepage Analysis		
<i>Drawn By</i>	YL	<i>Scale</i>	1:119
<i>Date</i>		<i>Company</i>	GN Northern, Inc.
		<i>File Name</i>	Section-A_flow_MP1_simple.slim

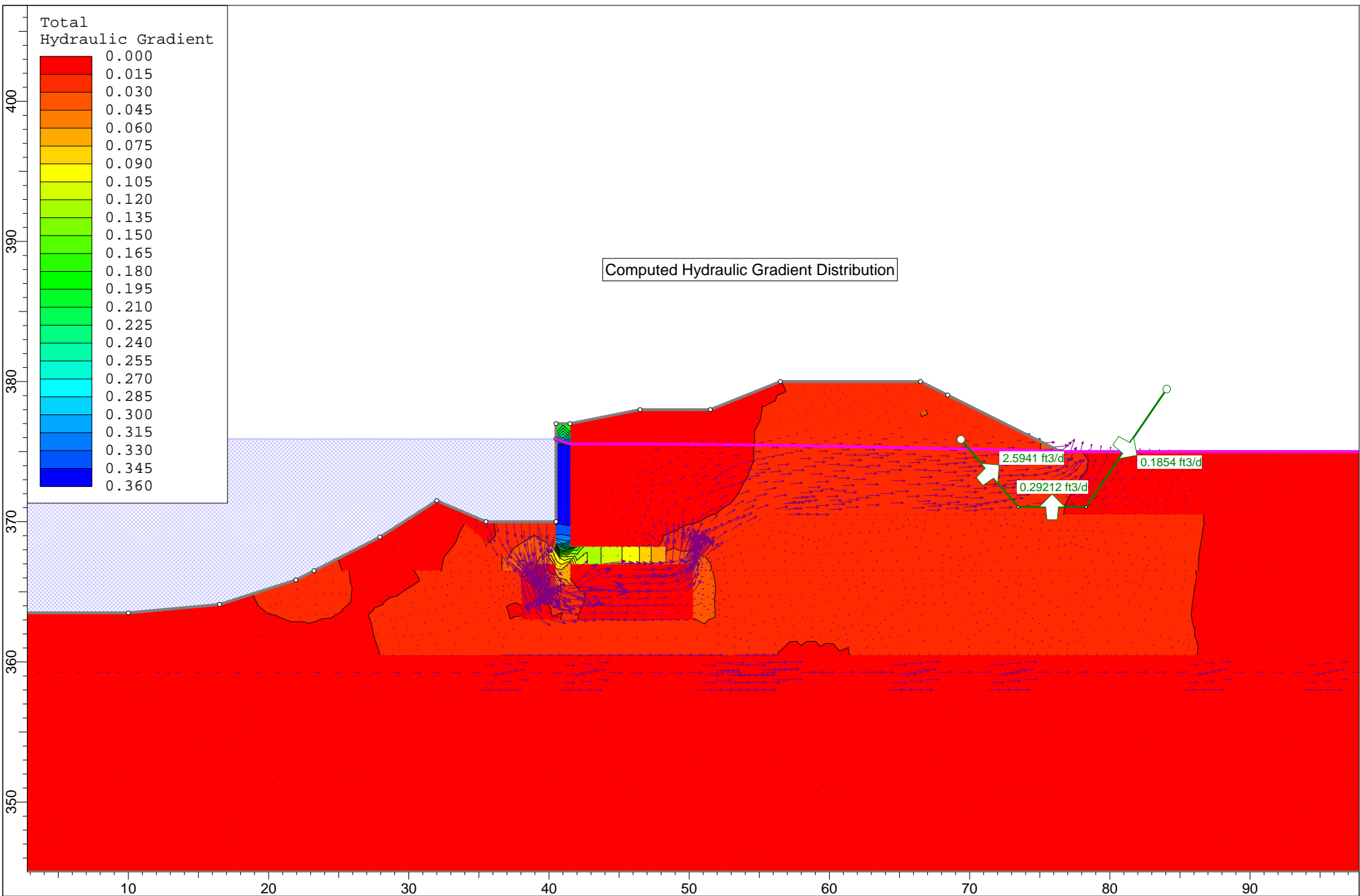
Material Name	Color	Model	KS (ft/s)	K2/K1	K1 Angle (deg)	Soil Type
Concrete		Simple	1e-012	1	0	Clay
Berm Fill		Simple	0.0003	1	0	Sand
Sandy Silt		Simple	2e-005	1	0	Silt
Silty with Sand / Silty Sand		Simple	2e-005	1	0	Silt
Silty Sandy Gravel		Simple	0.0005	1	0	Sand
Silt		Simple	1e-006	1	0	Silt
Cement-treated Aggregate		Simple	0.001	1	0	Sand
Cement Stabilized Soil		Simple	0.0005	1	0	Sand
Compacted Backfill		Simple	0.0003	1	0	Sand




	Project			Section B - Flood/Retaining Wall Seepage Analysis		
	Analysis Description			Finite Element Seepage Analysis		
	Drawn By	YL	Scale	1:125	Company	GN Northern, Inc.
	Date		File Name	Section-B_flow_MP1_simple.slim		



 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project			Section B - Flood/Retaining Wall Seepage Analysis		
	Analysis Description			Finite Element Seepage Analysis		
	Drawn By	YL	Scale	1:111	Company	GN Northern, Inc.
	Date		File Name	Section-B_flow_MP1_simple.slim		



Computed Hydraulic Gradient Distribution

 <b>Northern, Inc.</b> <small>Consulting Engineers Environmental Scientists Geologists Construction Materials Testing Geophysical Services</small>	Project			Section B - Flood/Retaining Wall Seepage Analysis		
	Analysis Description			Finite Element Seepage Analysis		
	Drawn By	YL	Scale	1:111	Company	GN Northern, Inc.
	Date		File Name	Section-B_flow_MP1_simple.slim		

*Appendix IV*  
*Settlement Analyses*

- Flood/Retaining Wall Design - West Richland, BentonCounty, WA  
 - GN Northern Project No.: 214-542

- Case: Exposed Wall Height = 4.0 ft

**(1) Elastic Settlement Calculation**

Footing Width (ft)		4		Strip Footing		Depth of Influence		18.5								
Layer No.	Material Type	Depth (ft)		$\gamma_{moist}$ Or $\gamma_{sat}$ (pcf)	N value	Equivalent Modulus of Elasticity, $E_s$ (psf)	Depth from bottom of footing to midpoint of layer, $z_f$ (ft)	Initial Vertical Effective Stress at Depth of Peak strain influence factor, $\sigma'_{zp}$ (psf)	Peak Strain Influence Factor, $I_{sp}$	Strain Influence Factor, $I_e$	H (ft)	$I_e * H / E_s$	Depth Factor, $C_1$	Secondary Creep Factor (t=50 yr), $C_2$	Shape Factor, $C_3$	$\delta_{Elastic}$ (inch)
		From	To													
1	Cement-treated aggregate	2.5	3.5	140	-	1500000	0.5	698	0.63	0.254	1.0	1.69E-07	0.862	1.540	0.73	0.00
2		3.5	4.5	140	-	1500000	1.5	698	0.63	0.361	1.0	2.41E-07	0.862	1.540	0.73	0.00
3	Very loose to loose SM	7.0	8.0	115	4	98000	5	698	0.63	0.577	1.0	5.88E-06	0.862	1.540	0.73	0.08
4	Loose SM	10.5	11.5	115	5	110000	8.5	698	0.63	0.393	1.5	5.36E-06	0.862	1.540	0.73	0.07
5		11.5	13.0	115	5	110000	9.75	698	0.63	0.328	1.5	4.47E-06	0.862	1.540	0.73	0.06
6	Very dense GW-GM	13.0	13.5	134	> 50	600000	10.75	698	0.63	0.275	0.5	2.29E-07	0.862	1.540	0.73	0.00
7		13.5	15.5	134	> 50	600000	12	698	0.63	0.210	2.0	6.99E-07	0.862	1.540	0.73	0.01
<b>Elastic Settlement:</b>															$\Sigma =$	<b>0.233</b>

**Schmertmann Method**

Groundwater level, ft	2.1	Below footing bottom at EL. 371'
Embedment depth (D), ft	2.5	
Moist unit weight ( $\gamma_{moist}$ ), lbs/ft <sup>3</sup>	130	
$\sigma'_{zD}$ (psf)	325	Vertical effective stress
at embedment depth (D)		
Factors for evaluating equivalent modulus of elasticity (D.P. Coduto 2001)		
$\beta_0$	50000	for Silty Sands (SM)
$\beta_1$	12000	
OCR	1	
$\beta_0$	100000	for Clean Sands (SW & SP)
$\beta_1$	24000	

**(2) Consolidated Settlement Calculation**

Layer No.	Material Type	Depth (ft)		At midpoint of soil layer						$C_c / (1+e_0)$	H (ft)	$\delta_{Consol}$ (inch)
		$z_f$ (ft)	$\gamma_{moist}$ Or $\gamma_{sat}$ (pcf)	$\sigma'_{z0}$ (psf)	$\Delta\sigma_z$ by footing load (psf)	$\sigma'_{zf}$ (psf)						
8	Compacted subgrade (ML)	4.5	5.5	2.5	100	630	376	1006	0.20	1.0	0.488	
9	Very soft to soft ML	5.5	7.0	3.75	112	686	192	878	0.25	1.5	0.483	
10	Very soft to soft ML	8.0	9.0	6	112	801	81	881	0.25	1.0	0.125	
11		9.0	10.5	7.25	112	863	56	919	0.25	1.5	0.123	
12	Dense ML	15.5	17.5	14	118	1238	15	1254	0.10	2.0	0.013	
13		17.5	19.5	16	118	1294	12	1306	0.10	2.0	0.010	
14	Very dense ML	19.5	20.5	17.5	120	1529	10	1538	0.05	1.0	0.002	
15		20.5	22.5	19	121	1615	8	1623	0.05	2.0	0.003	
16		22.5	24.5	21	122	1730	7	1737	0.05	2.0	0.002	
17		24.5	26.5	23	123	1845	6	1851	0.05	2.0	0.002	
17		26.5	27.5	24.5	124	1932	5	1937	0.05	1.0	0.001	
<b>Consolidation Settlement:</b>											$\Sigma =$	<b>1.250</b>
<b>Total Settlement (inch)</b>											$\Sigma =$	<b>1.48</b>

Soil Compressibility of Silt with low plasticity (ML), (D.P. Coduto 2001)

$C_c / (1+e_0)$	0.25	for highly compressible
	0.1	for moderately to slightly compressible
	0.05	for slightly compressible

- Flood/Retaining Wall Design - West Richland, Benton County, WA  
 - GN Northern Project No.: 214-542

- Case: Exposed Wall Height = 6 ft

(1) Elastic Settlement Calculation

Footing Width (ft) **6.5** Strip Footing Depth of Influence (ft) 28.5

Layer No.	Material Type	Depth (ft)		$\gamma_{moist}$ Or $\gamma_{sat}$ (pcf)	N value	Equivalent Modulus of Elasticity, $E_s$ (psf)	Depth from bottom of footing to midpoint of layer, $z_f$ (ft)	Initial Vertical Effective Stress at Depth of Peak strain influence factor, $\sigma'_{zp}$ (psf)	Peak Strain Influence Factor, $I_{sp}$	Strain Influence Factor, $I_e$	H (ft)	$I_e * H / E_s$	Depth Factor, $C_1$	Secondary Creep Factor (t=50 yr), $C_2$	Shape Factor, $C_3$	$\delta_{Elastic}$ (inch)
		From	To													
1	Cement-treated aggregate	2.5	3.5	140	-	1500000	0.5	892	0.62	0.233	1.0	1.55E-07	0.882	1.540	0.73	0.00
2		3.5	4.5	140	-	1500000	1.5	892	0.62	0.298	1.0	1.99E-07	0.882	1.540	0.73	0.00
3	Cement stabilized soil	4.5	5.5	135	-	1000000	2.5	892	0.62	0.363	1.0	3.63E-07	0.882	1.540	0.73	0.01
4		5.5	6.5	135	-	1000000	3.5	892	0.62	0.428	1.0	4.28E-07	0.882	1.540	0.73	0.01
5	Compacted subgrade (SM)	6.5	8.0	120	7	134000	4.75	892	0.62	0.510	1.5	5.71E-06	0.882	1.540	0.73	0.09
6	Loose SM	10.5	11.5	115	5	110000	8.5	892	0.62	0.560	1.0	5.09E-06	0.882	1.540	0.73	0.08
7		11.5	13.0	115	5	110000	9.75	892	0.62	0.520	1.5	7.09E-06	0.882	1.540	0.73	0.12
8	Very dense GW-GM	13.0	13.5	134	> 50	600000	10.75	892	0.62	0.488	0.5	4.06E-07	0.882	1.540	0.73	0.01
9		13.5	15.5	134	> 50	600000	12	892	0.62	0.448	2.0	1.49E-06	0.882	1.540	0.73	0.02
<b>Elastic Settlement: <math>\Sigma = 0.342</math></b>																

Schmertmann Method

Groundwater level, ft	2.1	Below footing bottom at EL. 371'
Embedment depth (D), ft	2.5	
Moist unit weight ( $\gamma_{moist}$ ), lbs/ft <sup>3</sup>	130	
$\sigma'_{zD}$ (psf)	325	Vertical effective stress at embedment depth (D)
Factors for evaluating equivalent modulus of elasticity (D.P. Coduto 2001)		
$\beta_0$	50000	for Silty Sands (SM)
$\beta_1$	12000	
OCR	1	
$\beta_0$	100000	for Clean Sands (SW & SP)
$\beta_1$	24000	

(2) Consolidated Settlement Calculation

Layer No.	Material Type	Depth (ft)		At midpoint of soil layer					$C_c / (1+e_0)$	H (ft)	$\delta_{Consol}$ (inch)
		from	to	$z_f$ (ft)	$\gamma_{sat}$ (pcf)	$\sigma'_{zo}$ (psf)	$\Delta\sigma_z$ by footing load (psf)	$\sigma'_{zf}$ (psf)			
10	Very soft to soft	8.0	9.0	6	112	868	149	1017	0.25	1.0	0.207
11	ML	9.0	10.5	7.25	112	930	105	1034	0.25	1.5	0.208
12	Very stiff	15.5	17.5	14	118	1333	29	1362	0.10	2.0	0.023
13	ML	17.5	19.5	16	118	1444	22	1467	0.10	2.0	0.016
14		19.5	20.5	17.5	120	1529	19	1547	0.05	1.0	0.003
15		20.5	22.5	19	120	1615	16	1631	0.05	2.0	0.005
16		22.5	24.5	21	120	1730	13	1743	0.05	2.0	0.004
17		24.5	26.5	23	120	1845	11	1856	0.05	2.0	0.003
18		26.5	28.5	25	120	1961	9	1970	0.05	2.0	0.002
19	Hard	28.5	30.5	27	120	2076	8	2084	0.05	2.0	0.002
20	ML	30.5	32.5	29	120	2191	7	2198	0.05	2.0	0.002
21		32.5	34.5	31	120	2306	6	2312	0.05	2.0	0.001
22		34.5	36.5	33	120	2421	5	2427	0.05	2.0	0.001
23		36.5	38.5	35	120	2537	5	2541	0.05	2.0	0.001
24		38.5	40.5	37	120	2652	4	2656	0.05	2.0	0.001
25		40.5	41.5	38.5	120	2738	4	2742	0.05	1.0	0.000
<b>Consolidation Settlement: <math>\Sigma = 0.480</math></b>											
<b>Total Settlement (inch) <math>\Sigma = 0.82</math></b>											

Elastic Modulus,  $E_s$  (psf)

1500000	for Cement Treated Aggregate
1000000	for Cement Stabilized Soil
600000	for GP-GM (USACE, Settlement Analysis EM 1110-1-1904)

Soil Compressibility of Silt with low plasticity (ML), (D.P. Coduto 2001)

$C_c / (1+e_0)$	0.25	for highly compressible
	0.1	for moderately to slightly compressible
	0.05	for slightly compressible



- Flood/Retaining Wall Design - West Richland, Benton County, WA  
 - GN Northern Project No.: 214-542

- Case: Exposed Wall Height = 8 ft

(1) Elastic Settlement Calculation

Footing Width (ft) **8.25** Strip Footing Depth of Influence (ft) 35.5

Layer No.	Material Type	Depth (ft)		$\gamma_{moist}$ Or $\gamma_{sat}$ (pcf)	N value	Equivalent Modulus of Elasticity, $E_s$ (psf)	Depth from bottom of footing to midpoint of layer, $z_f$ (ft)	Initial Vertical Effective Stress at Depth of Peak strain influence factor, $\sigma'_{zp}$ (psf)	Peak Strain Influence Factor, $I_{sp}$	Strain Influence Factor, $I_c$	H (ft)	$I_c * H / E_s$	Depth Factor, $C_1$	Secondary Creep Factor (t=50 yr), $C_2$	Shape Factor, $C_3$	$\delta_{Elastic}$ (inch)
		From	To													
1	Cement-treated aggregate	2.5	3.5	140	-	1500000	0.5	980	0.63	0.226	1.0	1.51E-07	0.903	1.540	0.73	0.00
2		3.5	4.5	140	-	1500000	1.5	980	0.63	0.278	1.0	1.86E-07	0.903	1.540	0.73	0.00
3	Cement stabilized soil	4.5	5.5	135	-	1000000	2.5	980	0.63	0.331	1.0	3.31E-07	0.903	1.540	0.73	0.01
4		5.5	6.5	135	-	1000000	3.5	980	0.63	0.383	1.0	3.83E-07	0.903	1.540	0.73	0.01
5	Compacted subgrade (SM)	6.5	8.0	120	7	134000	4.75	980	0.63	0.448	1.5	5.01E-06	0.903	1.540	0.73	0.10
6	Loose SM	10.5	11.5	115	5	110000	8.5	980	0.63	0.624	1.0	5.67E-06	0.903	1.540	0.73	0.12
7		11.5	13.0	115	5	110000	9.75	980	0.63	0.592	1.5	8.07E-06	0.903	1.540	0.73	0.16
8	Very dense GW-GM	13.0	13.5	134	> 50	600000	10.75	980	0.63	0.566	0.5	4.72E-07	0.903	1.540	0.73	0.01
9		13.5	15.5	134	> 50	600000	12	980	0.63	0.535	2.0	1.78E-06	0.903	1.540	0.73	0.04

Elastic Settlement:  $\Sigma =$  **0.450**

**Schmertmann Method**

Groundwater level, ft	2.1	Below footing bottom at EL. 371'
Embedment depth (D), ft	2.5	
Moist unit weight ( $\gamma_{moist}$ ), lbs/ft <sup>3</sup>	130	
$\sigma'_{zD}$ (psf)	325	Vertical effective stress at embedment depth (D)
Factors for evaluating equivalent modulus of elasticity (D.P. Coduto 2001)		
$\beta_0$	50000	for Silty Sands (SM)
$\beta_1$	12000	
OCR	1	
$\beta_0$	100000	for Clean Sands (SW & SP)
$\beta_1$	24000	

Elastic Modulus,  $E_s$  (psf)  
 1500000 for Cement Treated Aggregate  
 1000000 for Cement Stabilized Soil  
 600000 for GP-GM (USACE, Settlement Analysis EM 1110-1-1904)

Soil Compressibility of Silt with low plasticity (ML), (D.P. Coduto 2001)  
 $C_c / (1+e_0)$  0.25 for highly compressible  
 0.1 for moderately to slightly compressible  
 0.05 for slightly compressible

(2) Consolidated Settlement Calculation

Layer No.	Material Type	Depth (ft)		At midpoint of soil layer				$C_c / (1+e_0)$	H (ft)	$\delta_{Consol}$ (inch)	
		from	to	$z_f$ (ft)	$\gamma_{sat}$ (pcf)	$\sigma'_{z0}$ (psf)	$\Delta\sigma_z$ by footing load (psf)				$\sigma'_{zf}$ (psf)
10	Very soft to soft	8.0	9.0	6	112	868	226	1094	0.25	1.0	0.301
11	ML	9.0	10.5	7.25	112	930	160	1089	0.25	1.5	0.309
12	Very stiff	15.5	17.5	14	118	1333	45	1378	0.10	2.0	0.035
13	ML	17.5	19.5	16	118	1444	35	1479	0.10	2.0	0.025
14		19.5	20.5	17.5	120	1529	29	1558	0.05	1.0	0.005
15		20.5	22.5	19	120	1615	25	1640	0.05	2.0	0.008
16		22.5	24.5	21	120	1730	20	1750	0.05	2.0	0.006
17		24.5	26.5	23	120	1845	17	1862	0.05	2.0	0.005
18		26.5	28.5	25	120	1961	14	1975	0.05	2.0	0.004
19		28.5	30.5	27	120	2076	12	2088	0.05	2.0	0.003
20		30.5	32.5	29	120	2191	11	2202	0.05	2.0	0.003
21		32.5	34.5	31	120	2306	9	2315	0.05	2.0	0.002
22	Hard ML	34.5	36.5	33	120	2421	8	2430	0.05	2.0	0.002
23		36.5	38.5	35	121	2537	7	2544	0.05	2.0	0.001
24		38.5	40.5	37	122	2652	7	2658	0.05	2.0	0.001
25		40.5	42.5	39	123	2767	6	2773	0.05	2.0	0.001
26		42.5	44.5	41	124	2882	5	2887	0.05	2.0	0.001
27		44.5	46.5	43	125	2997	5	3002	0.05	2.0	0.001
28		46.5	48.5	45	126	3113	4	3117	0.05	2.0	0.001
29		48.5	50.5	47	127	3228	4	3232	0.05	2.0	0.001
30		50.5	51.5	48.5	128	3314	4	3318	0.05	1.0	0.000

Consolidation Settlement:  $\Sigma =$  **0.714**  
**Total Settlement (inch)  $\Sigma =$  1.16**

- Flood/Retaining Wall Design - West Richland, Benton County, WA  
 - GN Northern Project No.: 214-542

- Case: Exposed Wall Height = 10 ft

(1) Elastic Settlement Calculation

Footing Width (ft) **10** Strip Footing Depth of Influence (ft) 42.5

Layer No.	Material Type	Depth (ft)		$\gamma_{moist}$ Or $\gamma_{sat}$ (pcf)	N value	Equivalent Modulus of Elasticity, $E_s$ (psf)	Depth from bottom of footing to midpoint of layer, $z_f$ (ft)	Initial Vertical Effective Stress at Depth of Peak strain influence factor, $\sigma'_{zp}$ (psf)	Peak Strain Influence Factor, $I_{sp}$	Strain Influence Factor, $I_c$	H (ft)	$I_c * H / E_s$	Depth Factor, $C_1$	Secondary Creep Factor (t=50 yr), $C_2$	Shape Factor, $C_3$	$\delta_{Elastic}$ (inch)
		From	To													
1	Cement-treated aggregate	2.5	3.5	140	-	1500000	0.5	1072	0.64	0.222	1.0	1.48E-07	0.918	1.540	0.73	0.00
2		3.5	4.5	140	-	1500000	1.5	1072	0.64	0.265	1.0	1.77E-07	0.918	1.540	0.73	0.00
3	Cement stabilized soil	4.5	5.5	135	-	1000000	2.5	1072	0.64	0.309	1.0	3.09E-07	0.918	1.540	0.73	0.01
4		5.5	6.5	135	-	1000000	3.5	1072	0.64	0.353	1.0	3.53E-07	0.918	1.540	0.73	0.01
5	Compacted subgrade (SM)	6.5	8.0	120	7	134000	4.75	1072	0.64	0.407	1.5	4.56E-06	0.918	1.540	0.73	0.11
6	Loose SM	10.5	11.5	115	5	110000	8.5	1072	0.64	0.570	1.0	5.19E-06	0.918	1.540	0.73	0.13
7		11.5	13.0	115	5	110000	9.75	1072	0.64	0.625	1.5	8.52E-06	0.918	1.540	0.73	0.21
8	Very dense GW-GM	13.0	13.5	134	> 50	600000	10.75	1072	0.64	0.619	0.5	5.16E-07	0.918	1.540	0.73	0.01
9		13.5	15.5	134	> 50	600000	12	1072	0.64	0.593	2.0	1.98E-06	0.918	1.540	0.73	0.05

Elastic Settlement:  $\Sigma =$  **0.531**

**Schmertmann Method**  
 Groundwater level, ft **2.1** Below footing bottom at EL. 371'  
 Embedment depth (D), ft **2.5**  
 Moist unit weight ( $\gamma_{moist}$ ), lbs/ft<sup>3</sup> **130**  
 $\sigma'_{zD}$  (psf) 325 Vertical effective stress at embedment depth (D)  
 Factors for evaluating equivalent modulus of elasticity (D.P. Coduto 2001)  
 $\beta_0$  50000 for Silty Sands (SM)  
 $\beta_1$  12000  
 OCR 1  
 $\beta_0$  100000 for Clean Sands (SW & SP)  
 $\beta_1$  24000

Elastic Modulus,  $E_s$  (psf)  
 1500000 for Cement Treated Aggregate  
 1000000 for Cement Stabilized Soil  
 600000 for GP-GM (USACE, Settlement Analysis EM 1110-1-1904)

Soil Compressibility of Silt with low plasticity (ML), (D.P. Coduto 2001)  
 $C_c / (1+e_0)$  0.25 for highly compressible  
 0.1 for moderately to slightly compressible  
 0.05 for slightly compressible

(2) Consolidated Settlement Calculation

Layer No.	Material Type	Depth (ft)		At midpoint of soil layer				$C_c / (1+e_0)$	H (ft)	$\delta_{Consol}$ (inch)	
		from	to	$z_f$ (ft)	$\gamma_{sat}$ (pcf)	$\sigma'_{zo}$ (psf)	$\Delta\sigma_z$ by footing load (psf)				$\sigma'_{zf}$ (psf)
10	Very soft to soft	8.0	9.0	6	112	868	316	1184	0.25	1.0	0.405
11	ML	9.0	10.5	7.25	112	930	225	1154	0.25	1.5	0.423
12	Very stiff	15.5	17.5	14	118	1333	64	1397	0.10	2.0	0.049
13	ML	17.5	19.5	16	118	1444	49	1493	0.10	2.0	0.035
14		19.5	20.5	17.5	120	1529	41	1570	0.05	1.0	0.007
15		20.5	22.5	19	120	1615	35	1650	0.05	2.0	0.011
16		22.5	24.5	21	120	1730	29	1759	0.05	2.0	0.009
17		24.5	26.5	23	120	1845	24	1869	0.05	2.0	0.007
18		26.5	28.5	25	120	1961	20	1981	0.05	2.0	0.005
19		28.5	30.5	27	120	2076	18	2093	0.05	2.0	0.004
20		30.5	32.5	29	120	2191	15	2206	0.05	2.0	0.004
21		32.5	34.5	31	120	2306	13	2319	0.05	2.0	0.003
22		34.5	36.5	33	120	2421	12	2433	0.05	2.0	0.003
23		36.5	38.5	35	120	2537	10	2547	0.05	2.0	0.002
24	Hard ML	38.5	40.5	37	120	2652	9	2661	0.05	2.0	0.002
25		40.5	42.5	39	120	2767	8	2775	0.05	2.0	0.002
26		42.5	44.5	41	120	2882	8	2890	0.05	2.0	0.001
27		44.5	46.5	43	120	2997	7	3004	0.05	2.0	0.001
28		46.5	48.5	45	120	3113	6	3119	0.05	2.0	0.001
29		48.5	50.5	47	121	3228	6	3234	0.05	2.0	0.001
30		50.5	52.5	49	122	3343	5	3348	0.05	2.0	0.001
31		52.5	54.5	51	123	3458	5	3463	0.05	2.0	0.001
32		54.5	56.5	53	124	3573	5	3578	0.05	2.0	0.001
33		56.5	58.5	55	125	3689	4	3693	0.05	2.0	0.001
34		58.5	60.5	57	126	3804	4	3808	0.05	2.0	0.001
35		60.5	62.5	59	127	3919	4	3923	0.05	2.0	0.000

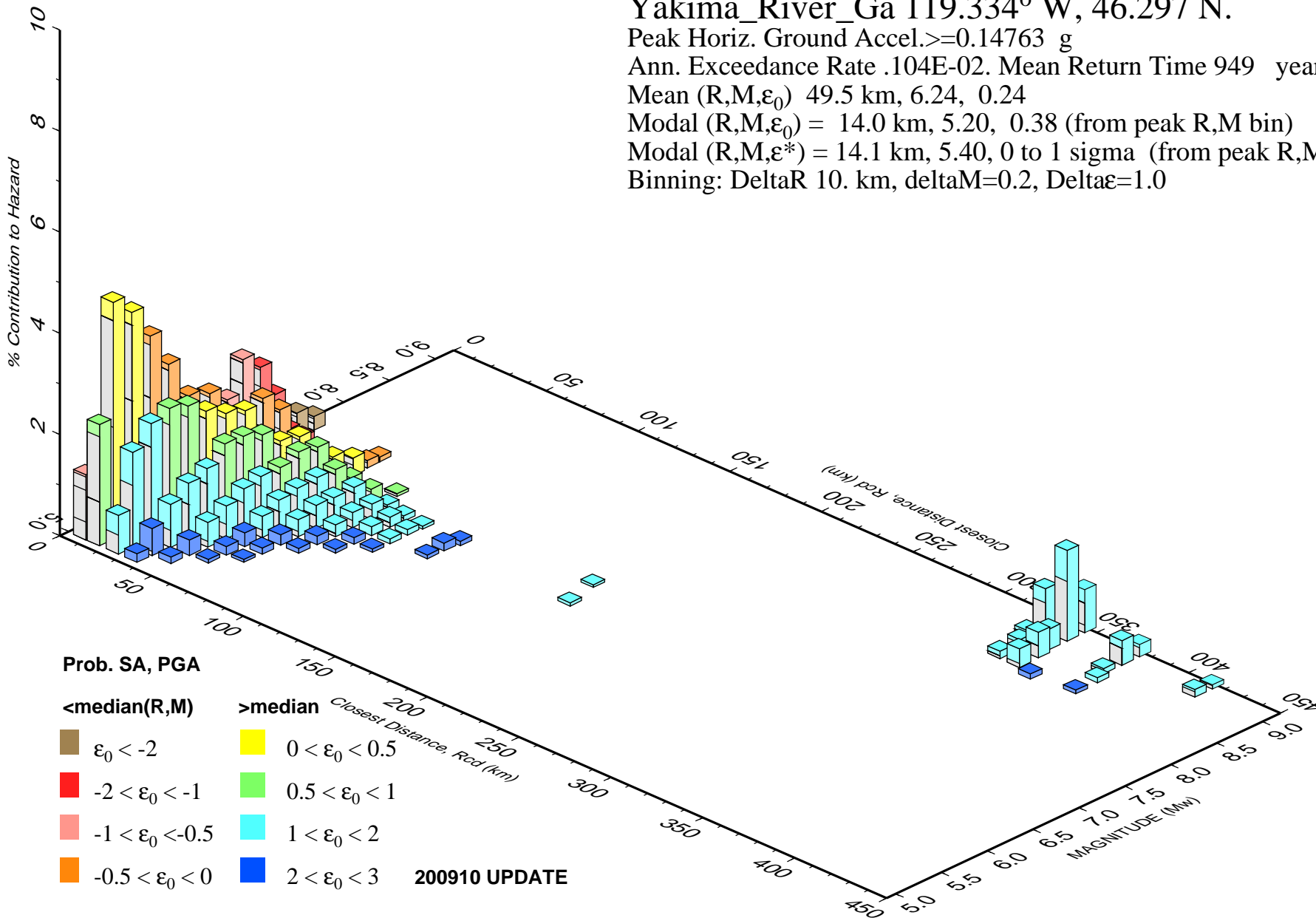
Consolidation Settlement:  $\Sigma =$  **0.978**

**Total Settlement (inch)  $\Sigma =$  1.51**

*Appendix V*  
*USGS PHS Deaggregation Output*

PSH Deaggregation on NEHRP D soil  
 Yakima\_River\_Ga 119.334° W, 46.297 N.

Peak Horiz. Ground Accel.  $\geq 0.14763$  g  
 Ann. Exceedance Rate .104E-02. Mean Return Time 949 years  
 Mean (R,M, $\epsilon_0$ ) 49.5 km, 6.24, 0.24  
 Modal (R,M, $\epsilon_0$ ) = 14.0 km, 5.20, 0.38 (from peak R,M bin)  
 Modal (R,M, $\epsilon^*$ ) = 14.1 km, 5.40, 0 to 1 sigma (from peak R,M, $\epsilon$  bin)  
 Binning: DeltaR 10. km, deltaM=0.2, Delta $\epsilon$ =1.0



*Appendix VI*  
*References*

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## APPENDIX E: CULTURAL RESOURCE SURVEY

# CULTURAL RESOURCES REPORT COVER SHEET

Author: Carol Schultze, Steven Dampf, Natalie Perrin, and Sylvia Tarman

Title of Report: Cultural Resources Inventory for the Yakima River Gateway Project, Benton County, Washington

Date of Report: December 2014

County(ies): Benton      Section: 5    Township: 9N    Range: 28E  
Section: 32    Township: 10N    Range: 28E

Quad: Richland    Acres: 3

PDF of report submitted (REQUIRED)  Yes

Historic Property Inventory Forms to be Approved Online?  Yes  No

Archaeological Site(s)/Isolate(s) Found or Amended?  Yes  No

TCP(s) found?  Yes  No

Replace a draft?  Yes  No

Satisfy a DAHP Archaeological Excavation Permit requirement?  Yes #  No

Were Human Remains Found?  Yes DAHP Case #  No

DAHP Archaeological Site #:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- Submission of PDFs is required.
- Please be sure that any PDF submitted to DAHP has its cover sheet, figures, graphics, appendices, attachments, correspondence, etc., compiled into one single PDF file.
- Please check that the PDF displays correctly when opened.





Cultural Resources Inventory for the  
Yakima River Gateway Project, Benton County, Washington

Submitted to:

MacKay  Sposito

Submitted by:

Historical Research Associates, Inc.  
Carol Schultze, PhD, RPA  
Steven Dampf, MS, RPA  
Natalie Perrin, MA  
Sylvia Tarman, BA

Spokane, Washington  
December 2014



HISTORICAL  
RESEARCH  
ASSOCIATES, INC.

*This report was prepared by HRA Principal Investigator Carol Schultze, PhD, RPA, and Steven Dampf, MS, RPA, who meet the Secretary of the Interior's professional qualifications standards for archaeology, and Natalie K. Perrin, MS, who meets the Secretary of the Interior's professional qualifications standards for architectural history. This report is intended for the exclusive use of the Client and its representatives. It contains professional conclusions and recommendations concerning the potential for project-related impacts to archaeological resources based on the results of HRA's investigation. It should not be considered to constitute project clearance with regard to the treatment of cultural resources or permission to proceed with the project described in lieu of review by the appropriate reviewing or permitting agency. This report should be submitted to the appropriate state and local review agencies for their comments prior to the commencement of the project.*

# Executive Summary

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The City of West Richland (City) is proposing to construct a recreational trail and trailhead along the Yakima River north of State Route (SR) 224. The Yakima River Gateway Project (Project) is located along Fallon Drive from West Van Giesen to areas near the West Richland Golf Course along the western bank of the Yakima River in Benton County, Washington. The City retained MacKay Sposito to develop a construction and permitting package for the Project.

Historical Research Associates, Inc. (HRA), was contracted by MacKay Sposito to complete a cultural resources inventory for the Project. The Project is subject to compliance with Governor's Executive Order 05-05 (EO 05-05), the Washington State Environmental Policy Act (SEPA), and statutes regarding the protection of archaeological and historic resources (WAC 197-11, RCW 27.53).

HRA conducted archival research including the environmental and cultural history of the Project Area of Impacts (AI). Archaeologists performed pedestrian transects and excavated 20 shovel probes as part of surface and subsurface inventory. Eleven buildings, structures, or objects (BSOs) in or adjacent to the AI were inventoried and evaluated by HRA's architectural historian. No archaeological resources were found. All recorded BSOs are recommended as not eligible for the National Register of Historic Places (NRHP). No additional cultural resources work is recommended.

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# 1. Introduction and Project Description

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The City of West Richland (City) is proposing to construct a recreational trail and trailhead along the Yakima River north of State Route (SR) 224. The City retained MacKay Sposito to develop a construction and permitting package for the Yakima River Gateway Project (Project). Historical Research Associates, Inc. (HRA), was contracted by MacKay Sposito to complete a cultural resources inventory for the Project, located in Section 5 of Township 9 North, Range 28 East, and Section 32 of Township 10 North, Range 28 East, Willamette Meridian, on the Richland USGS 7.5 minute series topographic map (1981) in Benton County, Washington (Figure 1-1). The Project is located on the west bank of the Yakima River along Fallon Drive (Dr.) from West Van Giesen/SR 224 to the West Richland Golf Course.

## 1.1 Regulatory Context and the Area of Impacts

### 1.1.1 *Regulatory Context*

Funding for the Project is being provided through a Washington State Recreation and Conservation Office (RCO) grant, which is subject to compliance with Governor's Executive Order 05-05 (EO 05-05), the Washington State Environmental Policy Act (SEPA), and statutes regarding the protection of archaeological and historic resources (WAC 197-11, RCW 27.53). The RCO initiated formal consultation with the Washington State Department of Archaeology and Historic Preservation (DAHP), the Confederated Tribes of the Umatilla Indian Reservation (Umatilla), and the Confederated Tribes and Bands of the Yakama Nation (Yakama), and is assisting the City in processing state environmental compliance documentation.

### 1.1.2 *Project Description and Area of Impacts*

The Project as currently proposed follows a 100-foot (ft)-wide and 0.25-mile (mi)-long corridor along the western bank of the Yakima River. Project elements include, but are not limited to, the pathway, landscaping, lighting, City entrance sign, sidewalks, restrooms, non-motorized river access, handicapped accessibility, interpretive signs, asphalt paving, and other improvements. A new parking area and restroom facility is proposed at the southern terminus of the trail, with the reconfiguring of the existing storm facility and removal of the current pump station. A portion of Fallon Dr. will be replaced with a park just north of SR 224.



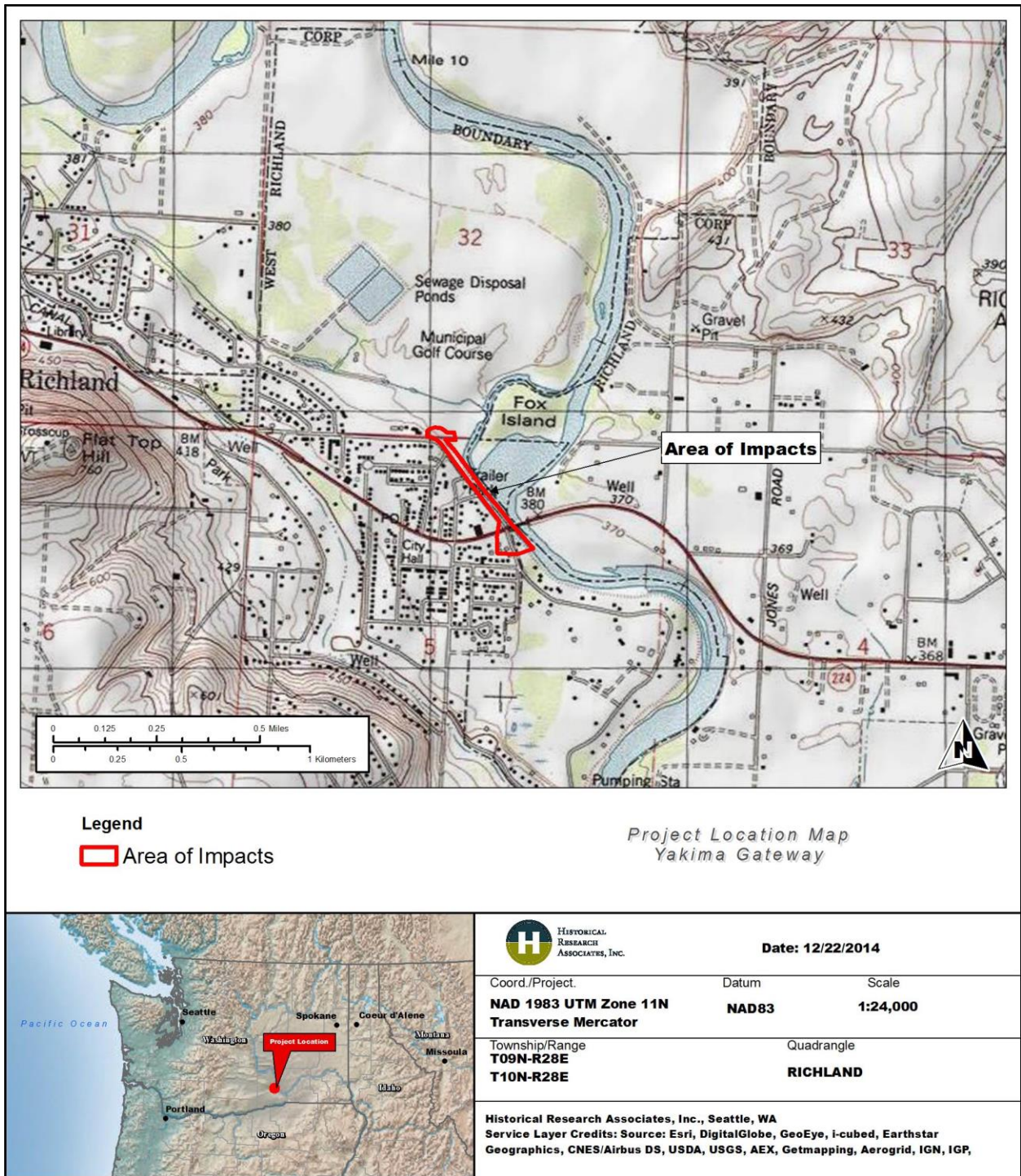


Figure 1-1. Location of the Project AI and vicinity.

HRA's review focused on the potential for the Project to affect archaeological resources within the proposed construction footprint and aboveground resources within or adjacent to the area of construction impacts. HRA's proposed Area of Impacts (AI) for the purpose of the cultural resources inventory included the footprint of the construction items listed above. Additionally, one tax parcel on either side of this AI was examined during the architectural inventory (Figure 1-2). HRA's review focused on the potential for the Project to affect archaeological resources within the construction footprint and aboveground resources within or adjacent to the area of construction impacts. Architectural survey conducted for this project (Section 6.2) revealed no historic-era properties eligible for or listed in the National Register of Historic Places (NRHP); therefore, the AI is limited to the area of construction impacts.

## **1.2 Agency and Tribal Communication**

Prior to archaeological fieldwork, the City, in coordination with the RCO, sent a letter and Project area map to the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and the Yakama Nation explaining the proposed project elements and HRA's cultural resources study (Appendix A). To date, the RCO has not received comments from the Yakama. As requested by the RCO, HRA archaeologist Steven Dampf followed the letter with an email and telephone call to the CTUIR tribal representative to gather information regarding traditional cultural use areas and historic land use in the project area.

Carey Miller (personal communication 2014), Tribal Historic Preservation Officer (THPO) for the CTUIR, said that she had no specific comments on the proposed Project, but emphasized the CTUIR should be contacted if any cultural resources were identified during the field investigation.



Figure 1-2. Project Area of Impacts (AI).

## 2. Physical Environment and Cultural Context

---

Over time, human land use patterns have tended to mirror the dynamic nature of environmental variables, such as topography, geology, and the availability of floral and faunal resources. Examining these fundamental factors is necessary to understanding the utilization of the environment by past human populations. The following information provides an overview of the resources potentially available to people occupying, traveling through, or seasonally frequenting the vicinity of the project area.

### 2.1 Physical Environment

#### 2.1.1 *Geology and Geomorphology*

The AI is located in the southern portion of the Columbia Basin environmental province (Franklin and Dyrness 1973:6). The Columbia Basin Province is the largest physiographic province in Oregon and Washington, bounded to the east, west, and south by mountains (the Rocky Mountain foothills, the Cascades, and the Blue Mountains, respectively), to the north by the Okanogan Highlands, and underlain by multiple basalt lava flows known as the Columbia River Basalt formation (Alt and Hyndeman 1995; Chatters 1998). The immense landform described as the Columbia Basin was initially shaped by these fine-grained basalts, as their immense weight caused the earth beneath to sink in a shallow bowl or "basin." Overlying Grande Ronde formations, the Wanapum basalt formations, and subsequent Saddle Mountains basalts flooded into the central depression of the Columbia Basin, starting between 14.5 and 13 million years ago (mya), although they added little extra volume (Alt and Hyndeman 1995:246,247). Collectively, between 1,970 to 4,920 ft of basalt forms the bedrock within the Columbia Basin (Franklin and Dyrness 1973:29).

Concurrently with the Miocene volcanic flows, and continuing to the present day, a series of faulting processes folded the southern Columbia Basin region into a series of east-west trending ridges and valleys (i.e., the Blue Mountains and Horse Heaven Hills), creating smaller sub-basins (i.e., the Pasco Basin) (Alt and Hyndeman 1995; Reidel et al. 1992). At some point between the Miocene and Pleistocene epochs (until roughly 2 mya), and likely in a dry, interglacial climate, wind-blown silts and other fine sediments were deposited into this eroded and shaped landscape from a source in south-central Washington. These fine sediments formed hilly loess formations throughout southeastern Washington and are known as the Palouse Formation (Alt and Hyndeman 1995:304–305; Busacca et al. 1992).

### 2.1.2 *Paleo-climate and Vegetation Shifts*

The climate and vegetation in the project vicinity have undergone changes since the end of the last ice age, approximately 11,000 years ago. These transitions provided a fluid and dynamic environment for the inhabitants of the project vicinity during the Holocene. By roughly 11,000 to 10,000 years ago, all but the highest and most northern glaciers had retreated, leaving the environment warm and moist during the spring and summer, and cold and dry over the winter. Grasses, sagebrushes, and chenopods flourished in the steppe region surrounding the AI (Chatters 1998). After about 9,500 to 9,000 years ago, precipitation increased in the Pacific Northwest as a whole, while conditions within the lower Columbia Basin became increasingly arid. Former grasslands around the AI were gradually replaced by higher proportions of drought-adapted sagebrushes and other open-ground plants (i.e., ragweed, *Ambrosia* spp.), while wind-blown loess sediments collected in local rock shelters (Chatters 1998).

Between about 6,500 and 6,300 years ago, another cooling period began, bringing higher levels of moisture to the semi-arid lower Columbia Basin. Vegetation levels increased in areas surrounding the Columbia and Yakima rivers, creating a paleosol on the adjacent floodplains (Chatters 1984, 1998; Hammatt 1977). Increasing episodes of flooding, with higher river-water temperatures, are also characteristic of this period (Chatters 1998:45). Between 4,500 and 2,100 years ago, an abrupt decrease in temperature, along with continued high moisture levels (over the winter-time), wrought a relatively dramatic environmental change in the Columbia Plateau as a whole, increasing the amount of forested areas in the Okanagan Highlands and extending a steppe-shrub-grassland into the project vicinity. Rivers and streams were colder, clearer, and gravel-bottomed (wonderful for salmonid reproduction); however, the spring thaw was later, condensing the collection of many riverine resources (including mussels and anadromous fish species) into a few summer months (Chatters 1998:46). After roughly 2,800 years ago, average temperatures in the project vicinity warmed again, creating the modern *Artemisia tridentate*/*Agropyron spicatum* (big sagebrush/bluebunch wheatgrass) vegetation association (Chatters 1998:46; Franklin and Dyrness 1973:216).

Vegetation observed in the AI during fieldwork included mature cottonwood trees, willow trees, and marsh plants including thistle and rosebush. Sagebrush was also observed in the vicinity.

### 2.1.3 *Faunal Resources*

Multiple species of animals have used and continue to inhabit the region surrounding the AI. In the early Holocene, elk (*Cervus elephus*), bison (*Bison bison*), mule deer (*Odocoileus hemionus*), white-tailed deer (*O. virginianus*), mountain sheep (*Ovis canadensis*), and pronghorn (*Antilocapra americana*) would have ranged over the steppe and foothills of the surrounding area. Bison were most common in the bunchgrass-supporting areas, largely from 2,400 to 1,800 years ago (Chatters 1998:46).

Smaller herbivorous mammals in the vicinity of the AI include black-tailed jackrabbit (*Lepus californicus*), cottontail rabbit (*Sylvilagus* spp.), yellow-bellied marmot (*Marmota flaviventris*), ground

squirrels (*Spermophilus* spp.), muskrat (*Ondatra zibethicus*), and beaver (*Castor canadensis*). Small to medium carnivores that may have been of interest to occupants of the area include river otter (*Lutra canadensis*), gray wolf (*Canis lupus*), coyote (*Canis latrans*), and badger (*Taxidea taxus*). Omnivores in the region, though likely further downstream, close to the salmon runs, include raccoons (*Procyon lotor*) and black bears (*Ursus americanus*). Ground birds available in the steppe-forest transitional zone include sage, sharp-tailed, and ruffed grouse (respectively *Centrocercus urophasianus*, *Tympanuchus phasianellus*, and *Bonasa umbellus*) and California quail (*Calipepla californica*). Migratory birds and waterfowl are less likely to breed in the Columbia Basin area, but the region is an important wintering area. Species available to the occupants of the area include the Canada goose (*Branta canadensis*), American wigeon (*Anas americana*), mallard (*Anas platyrhynchos*), canvasback (*Aythya valisineria*), and redhead (*Aythya americana*) (Chatters 1998:38–39, 41).

Evidence indicates that the local riverbeds were sandy and variable (shifting) during the early Holocene, although gravel-bedded streams are usually more productive for salmon and other migratory fish (Chatters 1998:42, 44). Sandy streams, however, are especially productive for the western ridgemussel (*Gonidea angulata*), which was harvested in early- to mid-summer (Chatters 1998). While salmon runs were likely variable over the centuries, depending on general moisture and levels of river aggradation, the main species of anadromous fish found in the lower- to mid-Columbia and Yakima rivers were and continue to be the Chinook (*Oncorhynchus tshawytscha*), sockeye (*O. nerka*), and coho (*O. kisutch*) salmon and the steelhead trout (*O. mykiss*) (Chatters 1998:39).

## 2.2 Cultural Context

### 2.2.1 Pre-contact Overview

The broad environmental changes through time in the region of the AI (outlined in Section 2.1) have influenced its inhabitants, faunal and human, therefore contributing to changes in the types and distribution of cultural material assemblages. These environmental conditions, however, do not take into account more local climatic shifts. Studies have shown that each area of the Plateau developed individualized shifts within its cultural chronology, suggesting impacts from localized environmental and cultural factors (Ames et al. 1998; Chatters 1998; Leonhardy and Rice 1970).

There is evidence for a pre-Clovis occupation across the Americas (Adovasio et al. 1990; Pringle 2011) including along the Pacific Coast of Washington (Kopperl et al. 2008; Waters et al. 2007:1122). However, in the Plateau the earliest archeological populations known are of the Clovis and Western Stemmed traditions, dating between 11,200 and 10,800 years before present (B.P.) (Dillehay 2000:5). These are characterized by a sophisticated lithic technology for large-game hunting, equivalent to the Upper Paleolithic of Europe (Fiedel 2000:41, 43). A recent find in central Alaska, however, dated to circa (ca.) 11,500 calendar years B.P., indicates that even as projectile technology appears to indicate a focus on large-game hunting, early North American occupants also

utilized a broader spectrum of plants and animals (Potter et al. 2011:1061). Some early Plateau sites are Marmes Rockshelter (11,230 ± 50 B.P.), the East Wenatchee Richey-Roberts Clovis Cache site (ca. 11,200 B.P.), Coopers Ferry (11,410 ± 130 B.P. and 11,370 ± 40 B.P.), and Buhl, Idaho (10,676 ± 95 B.P.) (Beck and Jones 2010:102).

The settlement patterns of these early hunters reflect mobility. These nomadic populations left settlers across all habitable zones of the Americas. Subsequent colonists turned from large-game hunting to economic intensification of region-specific, locally abundant resources. This period begins at the transition to Holocene conditions (10,000 B.P. in North America), and is termed the Archaic period (Dillehay 2000:7).

Early inhabitants of the region surrounding the AI would have been highly mobile, migrating between largely reliable habitation sites throughout the year. Habitation sites, most likely situated near stable and predictable seasonal resource locations, can be archaeologically identified by the presence of a variety of artifacts and features, such as stone and bone tools, associated debris from tool manufacturing processes, and "midden" materials used and discarded by site occupants (e.g., plant remains and other organic elements, bone, and shell fragments). These kind of foraging-related, habitation locations usually do not contain durable evidence for physical shelter or structures; they can therefore be easily confused with short-term resource gathering or "camp" sites from later periods. These later "camps," however, usually exhibit a more specialized set of material remains, related to the particular resource needing processing (Hicks 2004:395, 408–412).

Increasing moisture levels after approximately 5000 B.P. and an eventual decline in temperatures until about 2000 B.P. coincide roughly with a regional shift from mobile foraging to the more semi-sedentary "collector" subsistence pattern. This was by no means a permanent shift (Chatters 1986), nor one that occurred at the same time or with the same archaeological signature across the Plateau (Hicks 2004). This lifestyle, considered to be semi-sedentary in nature, is reflected in the archaeological record in several ways. The archaeological record for this time period includes habitation sites that are generally more intensively used and in more redundant locations, close to reliable resources. As mentioned above, these "camp" sites may be difficult to distinguish from resource-exploiting and processing sites from earlier periods. However, in later periods, "camps" tend to display increasing amounts of storage-related features, structural features (e.g., winter villages with pit houses along the Columbia River), and an intensification of feature use within the settlement itself (e.g., larger midden remains, or cleaned and reused hearth features with associated fire-modified rock) (Ames et al. 1998; Hicks and Morgenstein 1994).

The prehistoric inhabitants of the project vicinity developed subsistence strategies that appear to vary widely within what researchers consider a "semi-sedentary" settlement pattern. With more localized environmental shifts within the broad patterns described above, people had to adapt quickly, on a yearly or even seasonal basis. By roughly 2,000 years ago, modern vegetation and climatic conditions were established, and researchers rely on ethnographic studies for knowledge of game, fish, and plant food resources used by the region's people. By this time, the "Plateau culture

area" was quite firmly established, including such characteristics as riverine settlement patterns; reliance not only on anadromous and riverine fish (with a complex fishing technology), but on diverse game and root resources; complex kinship, resource-sharing, trade, and socio-religious ties with local and regional groups; and village-level political units (Spier 1936:5; Walker 1998:3).

### 2.2.2 *Ethnographic Overview*

The AI is within the traditional territories of the Palouse (part of the Confederated Tribes of the Colville Reservation), Yakama (Yakama Nation), Umatilla and Walla Walla (parts of the Confederated Tribes of the Umatilla Indian Reservation), Wanapum, and Nez Perce Tribes. These groups spoke dialects of the Sahaptan language family, a member of the Penutian Phylum (Walker 1998). Written ethnographic accounts of Interior Plateau life began with the expeditions of Lewis and Clark, 1804 to 1806 (Moulton 1988). Prior to the introduction of the horse, Plateau groups were politically autonomous at the village and band levels. Broader alliances between bands were secured through marriage, trade, and shared utilization of key fishing and gathering grounds (Walker 1998).

The settlement system was organized by seasonal cycles. Winter villages with semi-subterranean communal dwellings were constructed along the major rivers, while other settlements (both substantial and temporary in nature) were built away from the rivers to take advantage of seasonal plant and animal rounds (Walker 1998:3). Highly productive resource areas, such as the fishing areas around the confluence of the Columbia, Snake, and Yakima Rivers, would have attracted numerous tribes and bands at key resource-gathering times of the year.

Winter villages were located along the Columbia River and major tributaries, including the Yakima River, Walla Walla River, Umatilla River, and the Snake River (Sarna-Wojcicki et al. 1983). Several villages, more permanent habitation-sites, and ethnographic place-names were located in the vicinity of the Columbia River, within 5 mi of the AI. A settlement known as *Tomnosh* (Wanapam) was located on the eastern shore of the Columbia River, across from the mouth of the Yakima River (Ray 1936:144)

There was a winter camp or village site at present-day Richland, 1 mi to the southeast of the AI, known to the Wanapam as *Abonpa* ("sticks") (Relander 1956:296). The central village of the Chamnapum band (closely related to the Wanapam and Yakama), *Chamna* (Wanapam) was located close to the junction of the Columbia and Yakima Rivers near the AI (Relander 1956:298–299). Schuster claims that several Yakima villages were located in the vicinity of the Yakima/Columbia River confluence, noting that the Walla Walla and Umatilla peoples also settled in the area (Schuster 1982).

Native inhabitants of the Plateau region may have learned of coastal exploration by English, Spanish, and Russian vessels beginning in 1579 and continuing through the 1700s. Trading vessels from the U.S., Spain, Russia, and Great Britain carried out semi-regular exchange with Pacific Coastal groups by the 1780s (Walker and Sprague 1998:140).



### 2.2.3 *Euro American History*

European American explorers Lewis and Clark came through the area in 1805. Fur trading in the Plateau began in 1807 with David Thompson's explorations for the British North West Company. The Hudson Bay Company established a number of trading posts (Walker and Sprague 1998:142). Anglican missionaries established churches and schools in the interior northwest. Jesuit Catholic missionaries reached the Plateau in 1838. Settlers began arriving along the Oregon Trail in the 1840s. Their numbers increased through the decade, reaching up to 5,000 a year (Fuller 1947). The U.S. Congress formed the Washington Territory in 1853. Governor Stevens of the Washington Territory negotiated treaties simultaneously with several tribes at the Walla Walla treaty council of 1855, although these were not ratified until 1859, after a series of battles referred to as the Indian Wars. Placer gold deposits were found near Colville in 1854, bringing an influx of miners to the Plateau region (Kershner 2013).

The history of West Richland has been well documented (Kershner 2013), and is briefly summarized. In the 1870s, non-Native settlement in the region was primarily agrarian, and by 1879 private irrigation was drawing water from the Yakima River to create landscapes suitable for grazing. In 1892, the Horn Rapids Dam was constructed by the Yakima Irrigation and Improvement Company; though substantially rebuilt, the irrigation diversion exists today.

The first formal school building was constructed in 1896 east of the Yakima River, forcing students of present-day West Richland to cross the river daily by boat. One mother, Lena Fallon, rallied others in the community to petition the Yakima County Commissioners to build a bridge north of present-day Van Giesen Street (St.), which was subsequently named Fallon Bridge. Later, Fallon Bridge served as a crossing along the Yellowstone Trail Highway, one of the first highways marketed specifically towards the automobile leisure traveler (Kershner 2013).

Throughout the early 1900s and into the 1950s, the area continued to be largely agrarian. In 1949, two separate but adjacent cities, Herminger City and Enterprise, were founded, which combined to form the city of West Richland in 1953. When the city was formally incorporated in 1955, it boasted only 600 residents. That number almost doubled by 1959. In 1963, the U.S. Army Corps of Engineers completed the West Richland levee system, an approximately 5,885 ft levee embankment along the bank of the Yakima River. Operated and maintained by the Benton County Diking District No. 1, the levee was constructed to protect residential and other properties (U.S. Army Corps of Engineers 2011).

## 3. Archival Research

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Prior to fieldwork, HRA staff reviewed archaeological site records and cultural resource survey reports on file at DAHP's online database, the Washington Information System for Architectural and Archaeological Records Data (WISAARD), and HRA's reference library. These two repositories contain information about archaeological and historical research completed in the area, including inventory reports, archaeological site and historical structure forms, and NRHP nominations.

In addition, HRA research staff examined General Land Office (GLO) plats, Metsker and U.S. Geological Survey (USGS) maps, available online, to locate nearby historical features. These nineteenth-century maps, arranged by township and range, indicate locations of then extant historical structures, trails, and features. Although most of these structures are no longer extant, the maps indicate where historic period cultural resources could be encountered. Based on environmental characteristics, ethnographic data, and the distribution of previously recorded cultural resources, HRA formulated initial expectations about the sensitivity of the project AI for containing archaeological remains.

### 3.1 Previous Cultural Resource Investigations

Background research revealed that there are no previously conducted cultural resource studies directly within the AI. Within an approximate 1-mi radius, however, the review documented six previous studies (Table 3-1).

Archaeological research in the vicinity of the AI has fallen almost exclusively under the domain of cultural resources management (CRM) work. CRM, by its nature, focuses on development-oriented projects, and can be somewhat limited in its research scope. One study was conducted in support of a sewer project (Crisson and Komen 2002), and two projects were conducted in advance of a communications project (Greiser 2001; Harder and Hannum 2006). Three studies were conducted in the project vicinity for the Taptal Bend Project. Steinmetz (2002) completed a pedestrian survey of Fox Island and the eastern shore of the Yakima River, and identified Sites 45BN1277 and 45BN1278. The Umatilla Tribe performed cultural resources monitoring for bank restoration activities (Dickson 2004) and a pedestrian survey for the adjacent property on the east side of the river (Dickson 2005), but neither study identified cultural resources.

Table 3-1. Previous Cultural Resource Studies Located Within 1 mi of the AI.

Author(s)	Date	Title	Project Description	Cultural Resources Identified
Greiser	2001	<i>Cultural Resource Background Research and Field Inventory for American Tower's West Richland Communications Site, Benton County, Washington</i>	Background research, pedestrian survey	None
Crisson and Komen	2002	<i>A Cultural Resources Survey for the West Richland Sewer Interceptor and South Lagoon Decommissioning Project, Benton County, Washington</i>	Background research, pedestrian survey, shovel probes	Worked CCS chunk, Columbia Canal
Steinmetz	2002	<i>Cultural Resource Survey of the Tapteal Bend Project, Benton County, Washington</i>	Background research, pedestrian survey	45BN1277, 45BN1278
Dickson	2004	<i>Letter Report to Dawn Boorse Regarding Cultural Resource Monitoring for the Tapteal Bend Project, Benton County, Washington</i>	Monitoring	None
Dickson	2005	<i>Cultural Resource Survey of the Clarence M. Elstad Property for the Tapteal Bend Restoration Project, Benton County, Washington</i>	Background research, pedestrian survey	None
Harder and Hannum	2006	<i>Cultural Resource Survey for the West Richland Cellular Tower, Location #347345, Benton County, Washington</i>	Background research, pedestrian survey	None

### 3.2 Previously Recorded Archaeological Sites

A total of two archaeological isolates and one archaeological site have been documented within a 1-mi radius of the AI (Table 3-2). The isolated finds (45BN1277 and 45BN1278) are pre contact and include two flaked cobbles and a CCS flake identified on the east bank of the Yakima River (Barkely and Alexander 2002a, 2002b). Neither of these resources has been evaluated for listing in the NRHP. Archaeological site 45BN1125 is a section of historic irrigation canal, built in 1908–1909 by the Lower Yakima Irrigation Company to promote agricultural development around the town of Richland (Cadoret 1994). The site consists of an earthen canal built on a large dune, with a small concrete lined section, and was determined eligible for listing in the NRHP.

Table 3-2. Previously Recorded Archaeological Sites.

Resource	Site Type	Landform	Cultural Materials and Features	NRHP Status
45BN1125	Historic Agriculture	Plain	Historic irrigation canal, built in 1908–1909 by the Lower Yakima Irrigation Company	Eligible
45BN1277	Pre Contact Isolate	Floodplain	Quartzite cobble, flaked on one edge	Unevaluated
45BN1278	Pre Contact Isolate	Floodplain	CCS flake, flaked cobble	Unevaluated

### 3.3 Cemeteries

Only one cemetery has been recorded within 1 mi of the AI. The Wanawish Indian Cemetery (also known as the West Richland Cemetery) is located approximately 0.75 mi from the AI, on the east side of the Yakima River. This cemetery is owned and operated by the Yakama Tribe, and has been the site of many reburials of remains removed from several archaeological sites (BN128, BN161C, BN221, FR5, FR101, WW30, WW36, WW48, WW63, and Yakima Firing Center) (DAHP 2014).

### 3.4 Historic-era Architectural Resources and National Register Properties

No National or State Register Properties have been recorded within 1 mi of the AI; however, thirteen historical-era properties (greater than 45 years of age) are located within parcels immediately adjacent to the AI. According to Benton County Assessor building records, all of the historic-era properties adjacent to the AI are single family dwellings, built between 1940 and 1958 as recorded on the WISAARD database.

### 3.5 DAHP Predictive Model

DAHP’s predictive model is based on statewide information, using large-scale factors. Information on geology, soils, site types, and landforms, and GLO maps were used to establish or predict probabilities for prehistoric cultural resources throughout the state. DAHP’s model uses five categories for the predictions: Low Risk, Moderately Low Risk, Moderate Risk, High Risk, and Very High Risk. The AI is located within areas of High and Very High Risk for the discovery of cultural resources.

### 3.6 Historic Map Research

The 1865 GLO survey plat for Township 9 North, Range 28 East, and 10 North, Range 28 East, Willamette Meridian (United States Surveyor General [USSG] 1865) show trails running north–south along both sides of the Yakima River, but no other cultural features in the vicinity of the AI. The 1917 USGS topographic map shows a road and bridge, as well as 4 structures, in the vicinity of the AI; along the current alignment of Fallon Dr. and Hwy 224 (USGS 1917). The Hwy 224 bridge crosses directly adjacent to the AI. The Metsker Map Company Benton County Atlas from 1963 show the road and residential areas in place, although the West Richland Golf Course had not yet been built (Metsker 1963).

## 4. Expectations for Prehistoric, Ethnographic Period, and Historic Period Cultural Resources

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HRA reviewed site records, previous cultural resources studies, and historical map sources for the project vicinity to determine the types of cultural resources that may be encountered during cultural resources inventory. The AI is situated along the bank of the Yakima River, a type of landform on which many campsites and resource processing sites have been documented. Using results of the background research described above, HRA determined that the area has a high probability for archaeological resources that may be eligible for inclusion in the NRHP. Resources known or anticipated for the region including the AI could include cultural materials associated with hunter-fisher-gatherer, ethnographic, or historic Native American groups.

Prehistoric archaeological materials and features may include:

- Stone tools and flaking debris.
- Antler or non-sawed bone fragments.
- Charcoal concentrations and darkened earth.
- Fire-modified rock.
- Food and technological materials, such as cordage, from plants and animals.

In addition to those resources, ethnographic and historic Native American groups may have possessed metal implements, trade beads, and ammunition.

Cultural resources related to historic non-Native use of the AI may include deposits and features associated with agriculture, ranching, and early settlement, including road and trails.

Historic-Period archaeological materials might include:

- Low-fired and bisque ceramics with subdued colors, or blue/pink willow-like design; thick-bodied pieces indicating crockery.
- Non-tempered glass; violet-colored glass; stopper-topped glass jars or bottles; press-capped (cork gasket liner) heavy-walled soda or liquor bottles (not twist-top, thin-walled); zinc and vitreous glass-lidded glass canning jars with colored body.

- Miscellaneous fragments of metal (or plated) clothing closures (hooks and eyes, and suspender fittings, but not zippers), shell buttons, fragments of bakelite houseware, celluloid.
- Sawed animal bone and fruit pits.
- Enameled ironware.
- Punch-opened and solder-sealed beverage cans; solder-sealed food tins; (not thin-walled aluminum and welded-steel cans).
- Older automotive parts.
- Knob-and-tube electrical insulators.
- Construction materials such as concrete, milled lumber, brick, and metal rebar, hardware, and implements.

# 5. Field Strategy and Methods

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## 5.1 Archaeological Inventory

Prior to archaeological fieldwork, HRA arranged for utility locates to meet the requirements of Washington's new Underground Utilities regulations (RCW 19.122). HRA staff notified the Tribes about the schedule for the field survey and invited representatives to visit the fieldwork. HRA walked over the entire AI during archaeological pedestrian survey, given limitations of topography, ground cover, and disturbance. Survey transects were spaced at 10 meters (m) apart or less on average. The archaeologists sought out and examined all ground exposures (e.g., exposed trails, ditches, root-tips) for evidence of subsurface features and/or cultural materials. All survey areas were recorded with a Global Positioning System (GPS) instrument, utilizing HRA's standard Data Dictionary.

The character of the landscape and its potential for containing intact archaeological deposits determined the subsurface testing methods. Shovel probes (SPs) were excavated to check for buried archaeological materials. SPs were spaced at roughly 30 m intervals and excavated to depths of at least 50 centimeters (cm) below the surface and terminated after 20 cm of sterile sediments or rock impediments. SPs were terminated at shallower depths if the sediments reveal that substantial ground disturbance has previously occurred at a location. All excavated sediments were screened through 0.25-inch mesh to identify small cultural items that may have been present. Any cultural items older than 50 years, if found, would have been documented on HRA shovel probe forms and digital photography before being returned to the excavated hole. The characteristics of sediments observed in each SP were described on the standardized SP form, including evidence of subsurface disturbances and cultural materials. All probes were backfilled immediately following their termination and recording, and the turf replaced. The location of all SPs was documented using a GPS instrument.

Additionally, monitoring of geotechnical probes and hand augers was carried out. The HRA archaeologist described all sediments and contents on a daily monitoring record, including evidence of subsurface disturbances. Had any items been found they would have been documented and digitally photographed before being returned to the excavated trench or auger hole. The location of all subsurface excavation was documented using a GPS instrument.



## 5.2 Architectural Inventory

HRA used several methods to identify historic-era (45 years old or older<sup>1</sup>) resources within the AI. These include a review of WISAARD for previously surveyed historic-era built resources, a review of Benton County tax-assessor records, a review of historic-era maps, and a reconnaissance-level survey. Review of the Benton County tax-assessor records and WISAARD indicated that 14 buildings of an age to be eligible for the NRHP were located within or adjacent to the AI. Of these, none were previously determined eligible for listing in the NRHP. No properties listed in the NRHP are located within or adjacent to the construction area or AI.

On December 12, 2014, HRA's research archaeologist Sylvia Tarman conducted a reconnaissance-level inventory of cultural, architectural, and engineering resources aged 45 years old or older located within the project APE. Under the supervision of project architectural historian Natalie K. Perrin, MS, all historic-era properties were photographed from multiple angles and a cursory level of information for each resource (e.g., resource name, location, construction date, style, and type) was compiled using the DAHP Field Survey form. Perrin then reviewed each property via desktop and completed the online Historic Property Inventory (HPI) forms, including physical descriptions and eligibility recommendations.

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<sup>1</sup> The National Park Service defines 50 years old as the typical age requirement for listing in the NRHP. For the purposes of this review, HRA surveyed properties aged 45 years or older to capture those resources that might reach 50 years old over the course of the project.

# 6. Archaeological and Architectural Inventory Results

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## 6.1 Archaeological Inventory

HRA archaeologists conducted fieldwork from December 2 through 5, 2014. Work on December 2 consisted of monitoring geotechnical testing that included backhoe excavation of trenches and hand augering in order to determine the stability and suitability of the soils for construction of the Project. Surface and subsurface inventory of the AI was performed on December 3 through 5, 2014.

### 6.1.1 Geotechnical Test Trench and Auger Monitoring

On December 2, 2014, HRA Archaeologist Sylvia Tarman, BA, observed the ground disturbing activity associated with geotechnical testing along the AI.

Four trenches and three hand augers were excavated and monitored in the AI (Table 6-1; Figure 6-1). Fill dirt including modern debris was seen in all the excavations to depths of between 1 and 3.3 m below surface, suggesting that the area has been disturbed. Native sediments were observed in Trench 1 below 1 m and consisted of a sandy river deposit. No historic-era or prehistoric cultural materials were found during archaeological monitoring.

Table 6-1. Results of Geotechnical Trench and Auger Monitoring.

Excavation Type	Dimensions	Sediments	Cultural Material / Observations
Trench 1	1 x 2.5 x 3 m depth	0–1 m: medium brown loosely compact sandy silt – <i>fill</i>  1–3 m: dark brown coarse sand with high concentration of rounded cobbles – <i>river deposit</i>  Water table at approximately 2.5 m	None

Table 6-1. Results of Geotechnical Trench and Auger Monitoring.

Excavation Type	Dimensions	Sediments	Cultural Material / Observations
Trench 2	1.3 x 3.3 x 2.5 m depth	0–2.5 m: medium brown sandy silt with some subrounded cobbles – <i>fill</i>  1.6 m: a section of dark staining, possibly burned material, was encountered at on the east wall of the trench  Water table at approximately 2.5 m	One large chunk of concrete, a broken piece of milled lumber, and a partially charred fence post (from the stained soil) were uncovered in the trench, and left out when backfilled. None of the items were diagnostic to time period.
Trench 3	1.8 x 3.3 x 3.3 m depth	0–3.3 m: medium brown sandy silt with some subrounded cobbles – <i>fill</i>  Water table reached at approximately 3 m	Large amount of buried debris, solid concrete layer with rebar that was broken through by backhoe. Backhoe severed improperly located PVC irrigation line near top of trench. Other items in of trench include a crushed barrel (chemical type), a piece of asbestos pipe, rebar, chunks of yellow thermoplastic, and pieces of milled lumber.
Trench 4	0.6 x 0.6 x 1 m depth, square excavation trench to set up infiltration testing equipment	0–1 m: medium brown sandy silt with some subrounded cobbles – <i>fill</i>	None
Auger 1	0.5 m circular diameter to 0.6 m depth	0–0.6 m: dark brown coarse sand with a few rounded cobbles – <i>fill</i>  Water level at approximately 2 ft deep	Thin layer of asphalt at approximately 0.6 m
Auger 2	0.5 m circular diameter to 0.6 m depth	0–0.6 m: dark brown coarse sand with a few rounded cobbles – <i>fill</i>	None
Auger 3	0.5 m circular diameter to 0.6 m depth	0–0.6 m: medium brown silty sand with very few rounded cobbles – <i>fill</i>	None

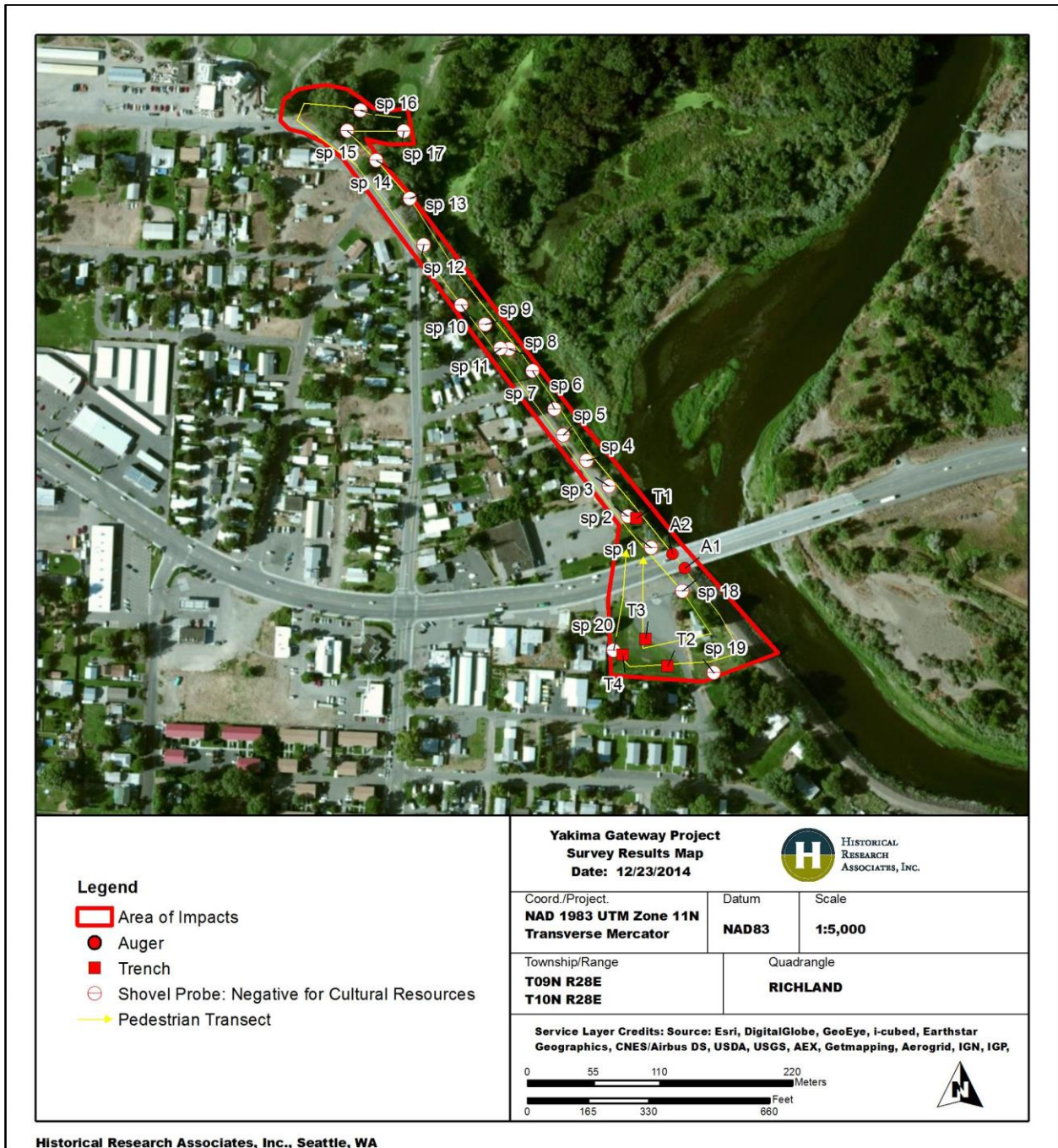


Figure 6-1. Results of archaeological survey.

### 6.1.2 Archaeological Survey and Shovel Probes

On December 3 through 5, 2014, HRA archaeologists Carol Schultze, PhD, RPA, Mary Leinhart, MA, Bethany Oliver, MA, and Justin Butler, BA, carried out surface and subsurface inventory of the AI. Conditions were cold and clear with little wind. Temperatures reached a high temperature of 34 degrees Fahrenheit during the day and fell below freezing overnight.

The AI is in an urbanized area consisting of parking areas, manufactured homes, and manicured lawns. HRA archaeologists walked the entire length of the AI in transects 10 m apart, examining exposures where they were present. To the south of Highway 224, the AI encompasses a housing development including manufactured homes, a heavily modified water drainage field, and the turnaround for S 35<sup>th</sup> Avenue (Ave.) (Figure 6-2). North of Highway 224, the AI follows the river bank along Butte Court (Ct.) (Figure 6-3). The riverbank exposure along this roadway was examined and observed to be stream deposited sediments, largely sand and rounded cobbles (Figure 6-4).



Figure 6-2. Disturbed drainage field at southern extent of AI and the location of SP10 and T4; view to the south.



Figure 6-3. Butte Ct. overlooking the Yakima River; view to the northeast.



Figure 6-4. Examining low river bank exposure north of the AI; view to the northeast.

North of Butte Ct., the AI continues along the riverbank through the manicured lawns of a several manufactured homes. The riverbank here was slightly more overgrown with willow trees, reeds, and marsh grasses. Modern items that were the possessions of the householders were observed in the backyards of each house (e.g., garden furniture). A piece of older farm or construction machinery was exposed in the bank that slumped toward the river. The artifact resembled a rusted bucket for a mechanical bucket loader; however, it appeared in the same sedimentary context as plastic and other modern debris. It was likely discarded along with other trash in the recent period, making it a secondary deposit that does not retain sufficient integrity to be recorded as an archaeological site or isolated find. Sediments were sands and cobbles similar to those found to the south.

S 38<sup>th</sup> Ave. crosses into the AI north of the manufactured homes. It turns north and continues to run parallel to the river until the golf course. In this area, HRA archaeologists examined the unpaved areas to the east of the road. A large area (in the vicinity of SP14, see Figure 6-1) had been filled in with dirt to create a pull out/vehicle turn around area. This location was elevated above the level of the stream bed by a large volume of imported sand and gravel. Local residents informed HRA that this material had been brought in within the last 30 years.

A historic-era dirt levy is located adjacent to the AI to the north, along the Yakima River as it flows past the West Richland Golf Course. The levy was recorded on an HPI form (Section 6.2, Appendix B). Archaeologists examined the levy in order to determine its extent and manner of construction. The levy does not continue south of the golf course property but was adjacent to the AI.

A total of 20 shovel probes (SPs) were excavated at 30-m intervals along the exposed river bank and in areas where the AI was not paved (see Figure 6-1; Appendix C). They ranged in depth from 33 cm to 65 cm, with the majority reaching depths of 50 cm below surface. The shallower probes were terminated on rock obstructions. Observed sediments were all silty and gravely sands consistent with primary or redeposited stream sediments (Figure 6-5). The majority of the sediments showed evidence of disturbance, associated with the road and manufactured home park construction.

No archeological materials were observed during subsurface inventory. The only cultural objects recovered were clearly modern debris, such as plastics, clear glass and Styrofoam. These intrusive modern items were found at depths between 10 cm and 61 cm. These findings are similar to that seen in the geotechnical trench and auger samples (Section 6.1.1).



Figure 6-5. SP4 at 50 cm showing typical sand and cobble sediments.

## 6.2 Architectural Inventory

Fifteen properties aged 45 years old or older were identified within or adjacent to the project AI (Figure 6-6; Table 6-2). Of these, three are located within the AI, specifically a levee constructed around 1950; a second levee constructed in 1963; and a single-family residence, located at 405 S 35<sup>th</sup> Avenue, built in 1950. All other properties reviewed were located adjacent to the AI (within one tax parcel).

Detailed descriptions of each property can be found in Appendix B, the HPI forms. The results of the reconnaissance survey are summarized in Table 6-2. Properties located at 420 Riverside Dr., 3655 West Van Giesen St., 241 Butte Ct., and 3913 Fallon Dr. were not visible from the public right-of-way (ROW). These properties were not recorded on HPI forms, as they are currently inventoried in WISAARD as part of a Benton County tax assessor information upload (Artifacts 2011) and this survey yielded no additional information.



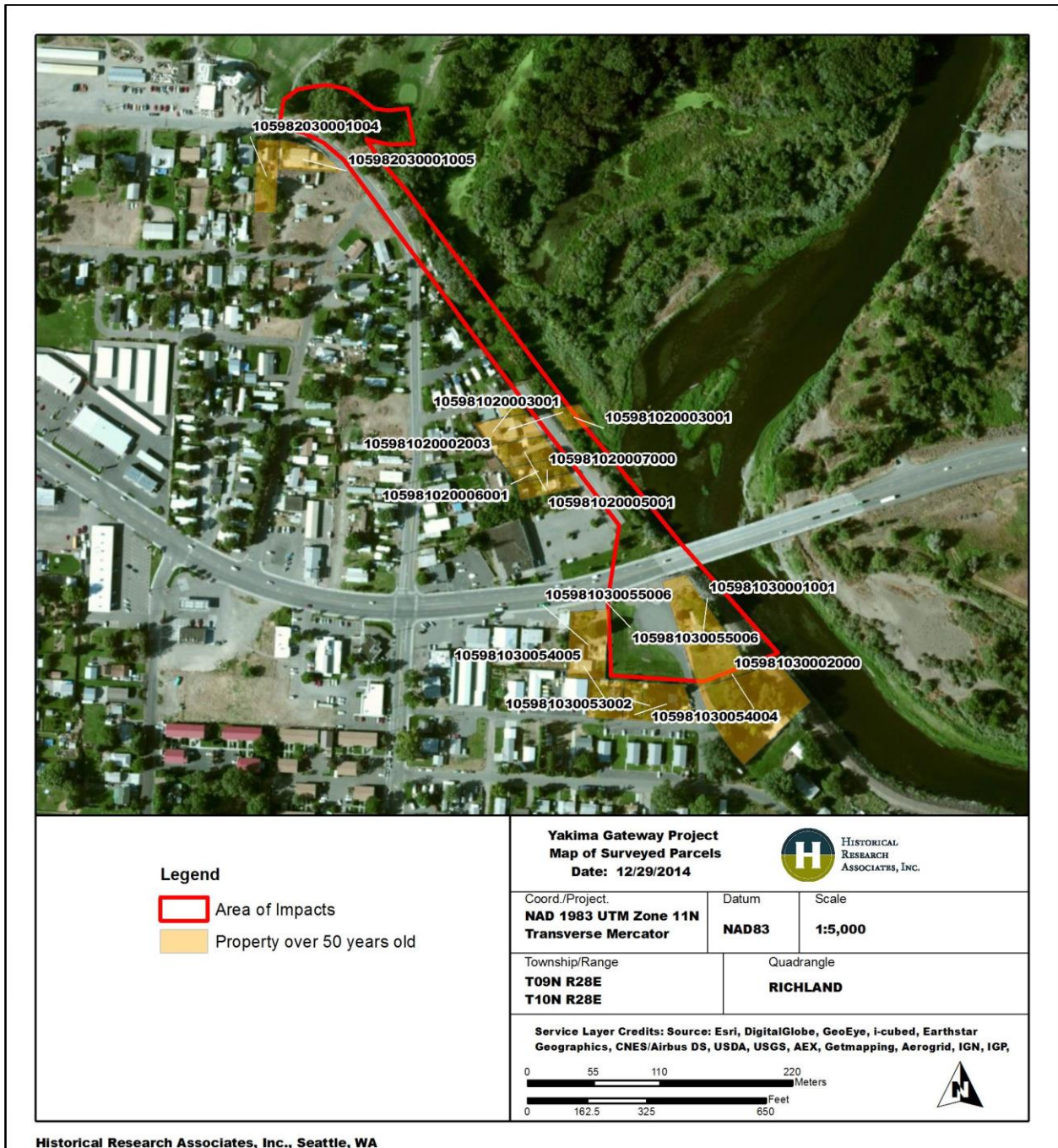


Figure 6-6. Results of architectural inventory.

Table 6-2. Architectural Resources Identified.




Map ID	Resource & Location	Map/Tax Lot	Construction Date(s)/ Resource Type	National Register Status	Photo
1	Diking District #1, West Richland levee system		1963 Structure: Levee	HRA recommends not eligible under Criterion C	
2*	420 Riverside Dr.	105981030002000	1950 Single-family residence	Undetermined	Not visible from ROW
3*	402 S 35 <sup>th</sup> Ave.	105981030001001	1950, altered Single-family residence	HRA recommends not eligible under Criterion C	
4	3518 Dodge St.	105981030053002	1930, altered Single-family residence	HRA recommends not eligible under Criterion C	

Table 6-2. Architectural Resources Identified.




Map ID	Resource & Location	Map/Tax Lot	Construction Date(s)/ Resource Type	National Register Status	Photo
5	3524 Dodge St.	105981030054004	1940 Single-family residence	HRA recommends not eligible under Criterion C	
6	3586 Dodge St.	105981030054005	1930 Single-family residence	HRA recommends not eligible under Criterion C	
7*	3655 W Van Giesen St.	105981030055006	1954 Single-family residence	Undetermined	Not visible from ROW
8*	265 Butte Ct.	105981020007000	1950, altered Single-family residence	HRA recommends not eligible under Criterion C	
9*	241 Butte Ct.	105981020006001	1940 Single-family residence	Undetermined	Not visible from ROW

Table 6-2. Architectural Resources Identified.






Map ID	Resource & Location	Map/Tax Lot	Construction Date(s)/ Resource Type	National Register Status	Photo
10*	229 Butte Ct.	105981020005001	1950 Single-family residence	HRA recommends not eligible under Criterion C	
11*	215 Butte Ct.	105981020003001	1951 Single-family residence	HRA recommends not eligible under Criterion C	
12*	209 Butte Ct.	105981020002003	1950 Single-family residence	HRA recommends not eligible under Criterion C	
13*	3901 Fallon Dr.	105982030001005	1958 Single-family residence	HRA recommends not eligible under Criterion C	

Table 6-2. Architectural Resources Identified.

Map ID	Resource & Location	Map/Tax Lot	Construction Date(s)/ Resource Type	National Register Status	Photo
14*	3913 Fallon Dr.	105982030001004	1949 Single-family residence	Undetermined	Not visible from ROW
15*	4000 Fallon Dr.		Ca. 1950, 1960 Levee, Warehouse	Warehouse appears to be no longer extant;  HRA recommends levee not eligible under Criterion C	

Map ID references map in Figure 6-6.

\*Indicates previously recorded in WISAARD.

# 7. Architectural Evaluation

---

## 7.1 Integrity

"Integrity is the ability of a property to convey its significance" (USDI 1991:44) and is related to how a property's physical features are tied to and convey its significance. It is based on "...why, where and when a property is important." In order to retain integrity, a property must retain most of the seven aspects of integrity, which are as follows:

- Location: the place where the property was constructed or the place where the historic event occurred.
- Design: the combination of elements that create the form, plan, space, structure, and style of a property.
- Setting: the physical environment of a historic property.
- Materials: the physical elements that were combined or deposited during a particular period of time, and in a particular pattern or configuration, to form a historic property.
- Workmanship: the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
- Feeling: a property's expression of the aesthetic or historic sense of a particular period of time.
- Association: the direct link between an important historic event or person and a historic property.

## 7.2 National Register of Historic Places Criteria

The criteria for listing a property in the NRHP require that, in addition to a building being over 50 years of age and possessing integrity, it must meet at least one of the following criteria, outlined in 36 CFR 60.4 (USDI 1991):

- A. Property is associated with events that have made a significant contribution to the broad patterns of our history; or
- B. Property is associated with the lives of persons significant in our past; or

- C. Property embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction; or
- D. Property has yielded, or is likely to yield, information important in prehistory or history.

### **7.3 Evaluation of Properties adjacent to the AI**

Of the 15 properties located within and adjacent to the AI, four could not be evaluated from the ROW. The other 11 are commonly encountered types of buildings that lack associations with specific persons or events in the history of the Tri-Cities area. As such, they are recommended not eligible for listing in the NRHP at a reconnaissance level. However, regardless of eligibility the project actions, constructing new pathways and parks in an urbanized context, should not affect any of the properties to such an extent that they would no longer be eligible to the NRHP, should eligibility be determined. HRA recommends no additional architectural survey or evaluation for the Project.

## 8. Summary and Recommendations

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### 8.1 Archaeological Resources

HRA conducted archaeological inventory of the AI in December 2014. HRA first conducted archaeological monitoring of geotechnical excavations, including four mechanically excavated trenches and three hand augers, in the AI. HRA archaeologists then conducted a pedestrian and subsurface inventory of the AI. The ground surface was examined for visible artifacts or cultural features older than 50 years, and 20 subsurface probes were excavated in unpaved and accessible portions of the AI. No prehistoric or historic-era cultural materials were found.

Despite the environmental and archival research indicating that there is a high to very high probability of encountering archaeological resources in this type of environment, the field investigations show the AI to be disturbed from modern construction activities, including the construction of the roadways, housing developments, and dumping of trash on the side of the roadway. Unless the project is redesigned, no further cultural resources work is recommended.

### 8.2 Architectural Resources

Fifteen buildings, structures, or objects (BSOs) greater than 45 years old were identified adjacent to or within the AI. Four could not be evaluated from the ROW, and the remaining 11 were recorded on HPI forms (Appendix B). The BSOs were evaluated at the reconnaissance level, and all were recommended not eligible for listing in the NRHP. The Project as currently designed has little to no potential to create a negative impact on the BSOs. HRA recommends no additional architectural survey or evaluation for the Project.

### 8.3 Accidental Discovery of Archaeological Resources

In the event that archaeological deposits are inadvertently discovered during construction in any portion of the AI, ground-disturbing activities should be halted immediately, and the City of West Richland (City) should be notified. The City would then contact DAHP and the interested Tribes, as appropriate.

### 8.4 Discovery of Human Remains

Any human remains that are discovered during construction of the Project will be treated with dignity and respect. The affected Native American Tribes are the Yakama Nation, Confederated Tribes of the Colville Reservation, and the Confederated Tribes of the Umatilla Indian Reservation.



If ground-disturbing activities encounter human skeletal remains during the course of construction, then all activity that may cause further disturbance to those remains **must** cease, and the area of the find must be secured and protected from further disturbance. In addition, the finding of human skeletal remains **must** be reported to the county coroner **and** local law enforcement in the most expeditious manner possible. The remains should not be touched, moved, or further disturbed.

The county coroner will assume jurisdiction over the human skeletal remains, and make a determination of whether those remains are forensic or non-forensic. If the county coroner determines the remains are non-forensic, they will report that finding to DAHP. DAHP will then take jurisdiction over those remains and report them to the appropriate cemeteries and affected tribes. The State Physical Anthropologist (Guy Tasa (360) 586-3534) will make a determination of whether the remains are Indian or non-Indian, and report that finding to any appropriate cemeteries and the affected tribes. DAHP will then handle all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.

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# Appendix A. Tribal Correspondence

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November 25, 2014

Carey Miller, Archaeologist I/THPO  
Confederated Tribes of the Umatilla Indian Reservation  
46411 Timine Way  
Pendleton, OR 97801

Re: Yakima River Gateway Project

Dear Ms. Miller:

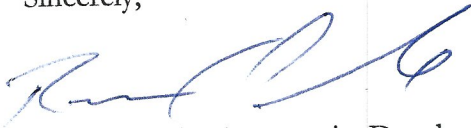
The City of West Richland (City) is proposing to construct a recreational trail located along Fallon Drive from West Van Giesen to areas near the West Richland Golf Course along the western bank of the Yakima River and Fox Island, located in Section 32 of Township 10 North, Range 28 East, and Section 5 of Township 9 North, Range 28 East, in Benton County, Washington. The proposed project elements include pathway construction, landscaping, lighting, City entrance sign, sidewalks, restroom, non-motorized river access, handicapped accessibility, interpretive signs, an overlook, asphalt paving, and other improvements. An existing dike with gravel access road will be used along the golf course as the trail route, and existing bridges and culverts will be used for trail crossings. A new parking area and restroom facility is proposed at the southern terminus of the trail, with the reconfiguring of the existing storm facility and removal of the current RV pump station. A portion of Fallon Drive will be replaced with a park just north of State Route (SR) 224. The route of proposed work measures approximately 1 mile long and up to 100 feet wide, although the final design and Area of Impact has yet to be determined. Geotechnical investigations will be conducted in previously disturbed areas near the SR 224 bridge and along the golf course; an archaeological monitor will be present for these borings. Investigations will include two soil tests south of the bridge one for the infiltration rates for the new parking lot, and a second for structural recommendations for a new restroom facility. Both of these tests will be conducted using a backhoe. We will also perform two hand auger tests under the bridge deck where siltation has occurred for design data for the pavement section. One test will be conducted just north of the bridge that will provide recommendations for structural design of an overlook and structural walls that will be needed to access to the OWHM. These tests will also be conducted using a backhoe. The last test will be conducted by a hand auger on the existing RCO berm and will provide design data for the pavement section. Funding for the project is being provided through a Washington State Recreation and Conservation Office (RCO) grant.



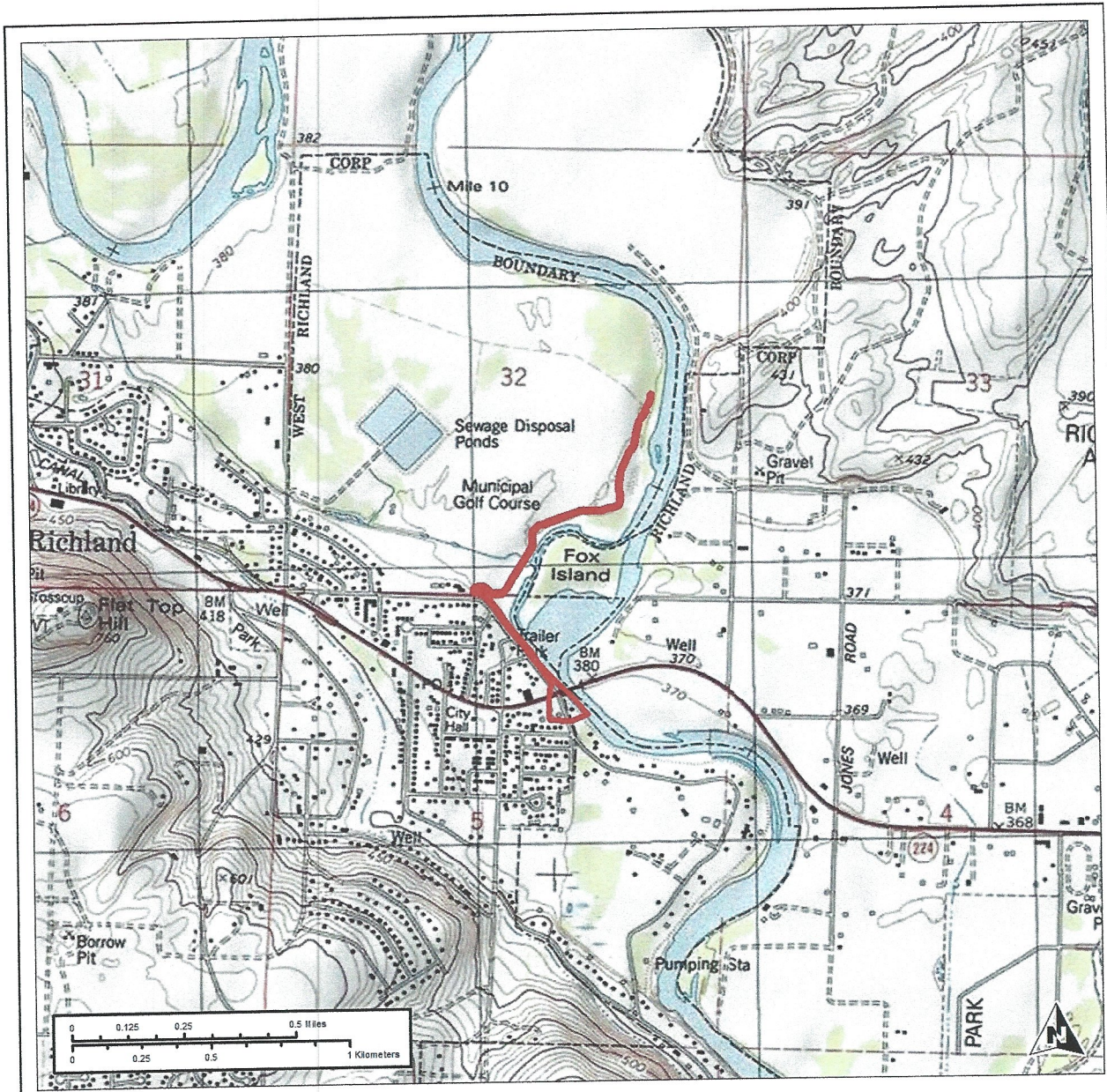
The City has contracted with Historical Research Associates, Inc. (HRA), to conduct the cultural resources assessment in compliance with Executive Order 05-05, the Washington State Environmental Policy Act (SEPA) and statutes regarding the protection of archaeological and historic resources (WAC 197-11, RCW 27.53). A preliminary review of the Washington State Department of Archaeology and Historic Preservation (DAHP) cultural resources database shows no previously recorded cultural resources within the proposed Area of Impact; however, a few pre-contact and historic archaeological sites have been identified in proximity to the proposed Area of Impact. HRA's assessment for the proposed project consists of archival and literature review, monitoring of geotechnical borings, pedestrian survey, subsurface investigations, and production of a technical report summarizing the results of the work that reflects professional standards for format and content as expressed in the guidelines prepared by DAHP. HRA is gathering existing archaeological, ethnographic, and historic data from DAHP, Spokane Public Library, Joel E. Ferris Research Library and Archives, and the Eastern Washington University Libraries.

HRA is planning to monitor geotechnical boring in the project area on December 2, 2014, with additional fieldwork commencing as soon as possible after the monitoring activities. Please contact me at (509) 967-5902, or HRA Project Archaeologist Steven Dampf at (509) 624-0441, at your earliest convenience if you have any questions, need additional information, or would like to meet and discuss the field reconnaissance.

Sincerely,



Russ Connole, Community Development Director  
City of West Richland, Community Development Department



 Project area

*Project Location Map  
Yakima River Gateway Project*



**HISTORICAL  
RESEARCH  
ASSOCIATES, INC.**

Date: 11/13/2014

Coord./Project.	Datum	Township/Range	Scale	Quadrangle
NAD 1983 UTM Zone 11N Transverse Mercator	NAD83		1:24,000	

Source Info  
Historical Research Associates, Inc. Missoula, MT  
Service Layer Credits: Copyright © 2013 National Geographic Society, i-cubed



# Appendix B. State of Washington Department of Archaeology and Historic Preservation Historic Property Inventory Forms

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# Historic Inventory Report

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## Location

---

Field Site No. \_\_\_\_\_ DAHP No. \_\_\_\_\_

Historic Name:

Common Name:

Property Address: 402 S 35TH, WEST RICHLAND, WA 99353

Comments:

Tax No./Parcel No. 105981030001001

Plat/Block/Lot BRIDGE ACRES LOT 1 TOGETHER WITH TRACT A. LESS P

Acreage 0.705

Supplemental Map(s) \_\_\_\_\_

Township/Range/EW	Section	1/4 Sec	1/4 1/4 Sec	County	Quadrangle
T09R28E	05			Benton	RICHLAND

## Coordinate Reference

Easting: 1935188

Northing: 353476

Projection: Washington State Plane South

Datum: HARN (feet)

## Identification

---

Survey Name: HRA 2339 Yakama Gateway

Date Recorded: 12/18/2014

Field Recorder: Perrin, Natalie

Owner's Name:

Owner Address:

City:

State:

Zip:

Classification: Building

Resource Status:

Comments:

Survey/Inventory

Within a District? No

Contributing? No

National Register:

Local District:

National Register District/Thematic Nomination Name:

Eligibility Status: Not Determined - SHPO

Determination Date: 1/1/0001

Determination Comments:



# Historic Inventory Report

## Description

Historic Use: Domestic - Single Family House	Current Use: Domestic - Single Family House		
Plan: Irregular	Stories: 1		
Changes to Plan: Moderate	Structural System: Unknown		
Changes to Original Cladding: Moderate	Changes to Interior: Unknown		
Changes to Other:	Changes to Windows: Extensive		
Other (specify):			
Style:	Cladding:	Roof Type:	Roof Material:
None	Veneer - Vinyl Siding	Gable - Cross Gable	Asphalt / Composition
Foundation:	Form/Type:		
Concrete - Poured	Single Family		

## Narrative

### Study Unit

### Other

None

Date of Construction:	1950 Built Date	Builder:
		Engineer:
		Architect:

Property appears to meet criteria for the National Register of Historic Places: No

Property is located in a potential historic district (National and/or local): No

Property potentially contributes to a historic district (National and/or local): No

Statement of Significance: Property was surveyed from the public right of way (ROW) at a reconnaissance level. Only preliminary background research was conducted. As such, property was not evaluated under Criteria A, B, or D. HRA recommends the building not eligible for listing under Criterion C, as it does not embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic details.

Description of Physical Appearance: Constructed in 1950, 402 S 35th Avenue is an altered minimal traditional. The building is one-story on a poured concrete foundation, and is irregular in plan though roughly L-shaped. The property is clad in vinyl siding and features vinyl windows throughout.

Major Bibliographic References:

## Photos



Viewing east  
West face and outbuilding  
2012



Viewing southeast  
Northwest oblique  
2014



Viewing east  
West face  
2014



Viewing north  
South face  
2014





2014 Google screenshot shows recent changes to property.

Google Screenshot

2014



# Historic Inventory Report

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## Location

---

Field Site No. \_\_\_\_\_ DAHP No. \_\_\_\_\_

Historic Name:

Common Name:

Property Address: 3518 Dodge St, West Richland, WA

Comments:

Tax No./Parcel No. 105981030053002

Plat/Block/Lot

Acreage

Supplemental Map(s) \_\_\_\_\_

Township/Range/EW	Section	1/4 Sec	1/4 1/4 Sec	County	Quadrangle
T09R28E	05			Benton	RICHLAND

## Coordinate Reference

Easting: 1935086

Northing: 353327

Projection: Washington State Plane South

Datum: HARN (feet)

## Identification

---

Survey Name: HRA 2339 Yakama Gateway

Date Recorded: 12/15/2014

Field Recorder: Perrin, Natalie

Owner's Name:

Owner Address:

City:

State:

Zip:

Classification: Building

Resource Status:

Comments:

Survey/Inventory

Within a District? No

Contributing? No

National Register:

Local District:

National Register District/Thematic Nomination Name:

Eligibility Status: Not Determined - SHPO

Determination Date: 1/1/0001

Determination Comments:



# Historic Inventory Report

## Description

Historic Use: Domestic - Single Family House	Current Use: Domestic - Single Family House		
Plan: Rectangle	Stories: 1.5	Structural System: Platform Frame	
Changes to Plan: Moderate	Changes to Interior: Unknown		
Changes to Original Cladding: Extensive	Changes to Windows: Extensive		
Changes to Other:			
Other (specify):			
Style:	Cladding:	Roof Type:	Roof Material:
Arts & Crafts - Craftsman	Veneer	Gable - Side Gable	Asphalt / Composition
Foundation:	Form/Type:		
Concrete - Poured	Single Family		

## Narrative

Study Unit	Other
None	
Date of Construction:	1930 Built Date
	Builder:
	Engineer:
	Architect:

Property appears to meet criteria for the National Register of Historic Places: No

Property is located in a potential historic district (National and/or local): No

Property potentially contributes to a historic district (National and/or local): No

Statement of Significance: Property was surveyed from the public right of way (ROW) at a reconnaissance level. Only preliminary background research was conducted. As such, property was not evaluated under Criteria A, B, or D. HRA recommends the building not eligible for listing under Criterion C, as it does not embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic details.

Description of Physical Appearance: 3518 Dodge Street is a heavily modified craftsman. The one-and-a-half story building sits on a poured concrete foundation, is clad in veneer siding, and features a side-gable roof. Windows throughout are aluminum sliders or vinyl. All windows and doors appear to be modern or replacements.

Major Bibliographic References:

## Photos

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Viewing southeast  
Northwest oblique  
2014



Viewing southwest  
Northeast oblique  
2014



Viewing northeast  
Southwest oblique  
2014



# Historic Inventory Report

---

## Location

---

Field Site No. \_\_\_\_\_ DAHP No. \_\_\_\_\_

Historic Name:

Common Name:

Property Address: 3524 Dodge St, West Richland, WA

Comments:

Tax No./Parcel No. 105981030054004

Plat/Block/Lot

Acreage

Supplemental Map(s) \_\_\_\_\_

Township/Range/EW	Section	1/4 Sec	1/4 1/4 Sec	County	Quadrangle
T09R28E	05			Benton	RICHLAND

## Coordinate Reference

Easting: 1935025

Northing: 353336

Projection: Washington State Plane South

Datum: HARN (feet)

## Identification

---

Survey Name: HRA 2339 Yakama Gateway

Date Recorded: 12/15/2014

Field Recorder: Perrin, Natalie

Owner's Name:

Owner Address:

City:

State:

Zip:

Classification: Building

Resource Status:

Comments:

Survey/Inventory

Within a District? No

Contributing? No

National Register:

Local District:

National Register District/Thematic Nomination Name:

Eligibility Status: Not Determined - SHPO

Determination Date: 1/1/0001

Determination Comments:



# Historic Inventory Report

## Description

Historic Use: Domestic - Single Family House	Current Use: Domestic - Single Family House		
Plan: Rectangle	Stories: 1.5	Structural System: Platform Frame	
Changes to Plan: Slight	Changes to Interior: Unknown		
Changes to Original Cladding: Slight	Changes to Windows: Slight		
Changes to Other:			
Other (specify):			
Style:	Cladding:	Roof Type:	Roof Material:
American Foursquare - Craftsman	Wood - Shiplap Wood - T 1-11	Gable	Asphalt / Composition - Shingle
Foundation:	Form/Type:		
Unknown	Single Family		

## Narrative

Study Unit	Other
None	
Date of Construction:	1940 Built Date
	Builder:
	Engineer:
	Architect:

Property appears to meet criteria for the National Register of Historic Places: No

Property is located in a potential historic district (National and/or local): No

Property potentially contributes to a historic district (National and/or local): No

Statement of Significance: Property was surveyed from the public right of way (ROW) at a reconnaissance level. Only preliminary background research was conducted. As such, property was not evaluated under Criteria A, B, or D. HRA recommends the building not eligible for listing under Criterion C, as it does not embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic details.

Description of Physical Appearance: Tax assessor records indicate that this late example Craftsman was built in 1940. The one-and-one-half story building features a front-gable roof with a gable porch over the central entry. The building is clad in horizontal shiplap siding and features shallow overhanging eaves. No beams or brackets are visible in the gable ends, though the rafter tails appear to be exposed. Windows on the first floor of the original massing are one-over-one wood sash; second floor windows are nine-pane multilight wood sash. A rear addition, clad in T1-11, features vinyl windows.

Major Bibliographic References:

## Photos



Viewing northeast  
Southwest oblique  
2014



Viewing southeast  
Northwest oblique  
2014



Viewing southwest  
Northeast oblique  
2014



Viewing northwest  
Southeast oblique  
2014



# Historic Inventory Report

---

## Location

---

Field Site No. \_\_\_\_\_ DAHP No. \_\_\_\_\_

Historic Name:

Common Name:

Property Address: 3586 Dodge St, West Richland, WA

Comments:

Tax No./Parcel No. 105981030054005

Plat/Block/Lot

Acreage

Supplemental Map(s) \_\_\_\_\_

Township/Range/EW	Section	1/4 Sec	1/4 1/4 Sec	County	Quadrangle
T09R28E	05			Benton	RICHLAND

## Coordinate Reference

Easting: 1934957

Northing: 353323

Projection: Washington State Plane South

Datum: HARN (feet)

## Identification

---

Survey Name: HRA 2339 Yakama Gateway

Date Recorded: 12/15/2014

Field Recorder: Perrin, Natalie

Owner's Name:

Owner Address:

City:

State:

Zip:

Classification: Building

Resource Status:

Comments:

Survey/Inventory

Within a District? No

Contributing? No

National Register:

Local District:

National Register District/Thematic Nomination Name:

Eligibility Status: Not Determined - SHPO

Determination Date: 1/1/0001

Determination Comments:





# Historic Inventory Report

## Description

Historic Use: Domestic - Single Family House	Current Use: Domestic - Single Family House		
Plan: Rectangle	Stories: 1.5	Structural System: Platform Frame	
Changes to Plan: Slight	Changes to Interior: Unknown		
Changes to Original Cladding: Extensive	Changes to Windows: Extensive		
Changes to Other:			
Other (specify):			
Style:	Cladding:	Roof Type:	Roof Material:
American Foursquare - Craftsman	Veneer - Vinyl Siding	Gable - Side Gable	Asphalt / Composition
Foundation:	Form/Type:		
Concrete - Poured	Single Family		

## Narrative

Study Unit	Other	
None		
Date of Construction:	1930 Built Date	Builder:
		Engineer:
		Architect:

Property appears to meet criteria for the National Register of Historic Places: No

Property is located in a potential historic district (National and/or local): No

Property potentially contributes to a historic district (National and/or local): No

Statement of Significance: Property was surveyed from the public right of way (ROW) at a reconnaissance level. Only preliminary background research was conducted. As such, property was not evaluated under Criteria A, B, or D. HRA recommends the building not eligible for listing under Criterion C, as it does not embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic details.

Description of Physical Appearance: This one-and-one-half story modified Craftsman bungalow is built on a poured concrete foundation and features a side-gable roof with a hip-roof dormer on the front face. The south façade features seven banks of three-over-one wood sash windows flanking a nine-light pedestrian door; this area likely marks an original porch that has since been converted to interior space. The building is clad in vinyl siding and, with the exception of the front façade, features vinyl windows throughout. Decorative brackets are located in the gable ends on the east and west faces.

Major Bibliographic References:

## Photos



Viewing north  
South facade  
2014



Viewing northwest  
Southeast oblique  
2014



Viewing northeast  
Southwest oblique  
2014



# Historic Inventory Report

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## Location

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Field Site No. \_\_\_\_\_ DAHP No. \_\_\_\_\_

Historic Name:

Common Name:

Property Address: 265 BUTTE, WEST RICHLAND, WA 99353

Comments:

Tax No./Parcel No. 105981020007000

Plat/Block/Lot MORTON'S PLAT LOT 7 AND THAT PORITON OF LOT 15 DEF

Acreage 0.195

Supplemental Map(s) \_\_\_\_\_

---

Township/Range/EW	Section	1/4 Sec	1/4 1/4 Sec	County	Quadrangle
T09R28E	05			Benton	RICHLAND

---

## Coordinate Reference

Easting: 1934740

Northing: 353890

Projection: Washington State Plane South

Datum: HARN (feet)

## Identification

---

Survey Name: HRA 2339 Yakama Gateway

Date Recorded: 12/15/2014

Field Recorder: Perrin, Natalie

Owner's Name:

Owner Address:

City:

State:

Zip:

Classification: Building

Resource Status:

Comments:

Survey/Inventory

Within a District? No

Contributing? No

National Register:

Local District:

National Register District/Thematic Nomination Name:

Eligibility Status: Not Determined - SHPO

Determination Date: 1/1/0001

Determination Comments:



# Historic Inventory Report

## Description

Historic Use: Domestic - Single Family House	Current Use: Domestic - Single Family House		
Plan: Rectangle	Stories: 1	Structural System: Platform Frame	
Changes to Plan: Unknown	Changes to Interior: Unknown		
Changes to Original Cladding: Extensive	Changes to Windows: Extensive		
Changes to Other:			
Other (specify):			
Style:	Cladding:	Roof Type:	Roof Material:
Modern - Minimal Traditional	Veneer - Vinyl Siding	Gable - Side Gable	Asphalt / Composition
Foundation:	Form/Type:		
	Single Family		

## Narrative

Study Unit	Other
Date of Construction:	1950 Built Date
	Builder:
	Engineer:
	Architect:

Property appears to meet criteria for the National Register of Historic Places: No

Property is located in a potential historic district (National and/or local): No

Property potentially contributes to a historic district (National and/or local): No

Statement of Significance: Property was surveyed from the public right of way (ROW) at a reconnaissance level. Only preliminary background research was conducted. As such, property was not evaluated under Criteria A, B, or D. HRA recommends the building not eligible for listing under Criterion C, as it does not embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic details.

Description of Physical Appearance: This one-story minimal traditional has been extensively renovated. The building is constructed on a poured-concrete foundation and features a side-gable roof with a rear wing. The building is clad in vinyl siding and features vinyl windows throughout. A small gable porch on the front face accesses a modern entry door. A garage building is located behind the main house and is clad in horizontal board siding, likely indicative of the original cladding of the main house.

Major Bibliographic References:

## Photos

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Viewing northwest  
Southeast oblique  
2014



Viewing southwest  
Northeast oblique  
2014



Viewing west  
Southeast oblique  
2014



# Historic Inventory Report

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## Location

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Field Site No. \_\_\_\_\_ DAHP No. \_\_\_\_\_

Historic Name:

Common Name:

Property Address: 229 BUTTE, WEST RICHLAND, WA 99353

Comments:

Tax No./Parcel No. 105981020005001

Plat/Block/Lot MORTON'S PLAT LOT 5: TOGETHER WITH THE SOUTH HALF

Acreage 0.258

Supplemental Map(s) \_\_\_\_\_

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Township/Range/EW	Section	1/4 Sec	1/4 1/4 Sec	County	Quadrangle
T09R28E	05			Benton	RICHLAND

---

## Coordinate Reference

Easting: 1934677

Northing: 353982

Projection: Washington State Plane South

Datum: HARN (feet)

## Identification

---

Survey Name: HRA 2339 Yakama Gateway

Date Recorded: 12/15/2014

Field Recorder: Perrin, Natalie

Owner's Name:

Owner Address:

City:

State:

Zip:

Classification: Building

Resource Status:

Comments:

Survey/Inventory

Within a District? No

Contributing? No

National Register:

Local District:

National Register District/Thematic Nomination Name:

Eligibility Status: Not Determined - SHPO

Determination Date: 1/1/0001

Determination Comments:



# Historic Inventory Report

## Description

Historic Use: Domestic - Single Family House	Current Use: Domestic - Single Family House		
Plan: L-Shape	Stories: 1	Structural System: Platform Frame	
Changes to Plan: Unknown	Changes to Interior: Unknown		
Changes to Original Cladding: Extensive	Changes to Windows: Extensive		
Changes to Other:			
Other (specify):			
Style:	Cladding:	Roof Type:	Roof Material:
Ranch	Veneer - Vinyl Siding	Gable	Asphalt / Composition
Foundation:	Form/Type:		
Concrete - Poured	Single Family		

## Narrative

Study Unit	Other
None	
Date of Construction:	1950 Built Date
	Builder:
	Engineer:
	Architect:

Property appears to meet criteria for the National Register of Historic Places: No

Property is located in a potential historic district (National and/or local): No

Property potentially contributes to a historic district (National and/or local): No

Statement of Significance: Property was surveyed from the public right of way (ROW) at a reconnaissance level. Only preliminary background research was conducted. As such, property was not evaluated under Criteria A, B, or D. HRA recommends the building not eligible for listing under Criterion C, as it does not embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic details.

Description of Physical Appearance: This one-story house is a modified ranch. Constructed on a poured concrete foundation, the building features a side-gable roof and is clad in T1-11 siding. Windows throughout the house are vinyl.

Major Bibliographic References:

## Photos



Viewing southwest  
Northeast oblique  
2014



Viewing southwest  
Northeast oblique  
2014



2014





# Historic Inventory Report

---

## Location

---

Field Site No. \_\_\_\_\_ DAHP No. \_\_\_\_\_

Historic Name:

Common Name:

Property Address: 215 BUTTE, WEST RICHLAND, WA 99353

Comments:

Tax No./Parcel No. 105981020003001

Plat/Block/Lot MORTON'S PLAT LOT 3 AND THE NORTH HALF OF LOT 4: T

Acreage 0.309

Supplemental Map(s) \_\_\_\_\_

Township/Range/EW	Section	1/4 Sec	1/4 1/4 Sec	County	Quadrangle
T09R28E	05			Benton	RICHLAND

## Coordinate Reference

Easting: 1934625

Northing: 354042

Projection: Washington State Plane South

Datum: HARN (feet)

## Identification

---

Survey Name: HRA 2339 Yakama Gateway

Date Recorded: 12/15/2014

Field Recorder: Perrin, Natalie

Owner's Name:

Owner Address:

City:

State:

Zip:

Classification: Building

Resource Status:

Comments:

Survey/Inventory

Within a District? No

Contributing? No

National Register:

Local District:

National Register District/Thematic Nomination Name:

Eligibility Status: Not Determined - SHPO

Determination Date: 1/1/0001

Determination Comments:



# Historic Inventory Report

## Description

Historic Use: Domestic - Single Family House	Current Use: Domestic - Single Family House		
Plan: Rectangle	Stories: 1	Structural System: Platform Frame	
Changes to Plan: Unknown	Changes to Interior: Unknown		
Changes to Original Cladding: Extensive	Changes to Windows: Moderate		
Changes to Other:			
Other (specify):			
Style:	Cladding:	Roof Type:	Roof Material:
Modern - Minimal Traditional	Veneer - Vinyl Siding	Gable - Side Gable	Asphalt / Composition
Foundation:	Form/Type:		
Concrete - Poured	Single Family		

## Narrative

Study Unit	Other
None	
Date of Construction:	1951 Built Date
	Builder:
	Engineer:
	Architect:

Property appears to meet criteria for the National Register of Historic Places: No

Property is located in a potential historic district (National and/or local): No

Property potentially contributes to a historic district (National and/or local): No

Statement of Significance: Property was surveyed from the public right of way (ROW) at a reconnaissance level. Only preliminary background research was conducted. As such, property was not evaluated under Criteria A, B, or D. HRA recommends the building not eligible for listing under Criterion C, as it does not embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic details.

Description of Physical Appearance: This one-story house is a modified minimal traditional. Built on a poured concrete foundation, the building is clad in vinyl siding and features a side gable roof. An attached garage addition with a salt box roof is located on the south face. Original six-light wood windows are located on the east façade; one two-over-two wood sash window is located adjacent to the garage addition on the south face. The covered front entry is supported by decorative metal posts.

Major Bibliographic References:

## Photos



Viewing northwest  
Southeast oblique  
2014



Viewing southwest  
Northeast oblique  
2014



2014



# Historic Inventory Report

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## Location

---

Field Site No. \_\_\_\_\_ DAHP No. \_\_\_\_\_

Historic Name:

Common Name:

Property Address: 209 BUTTE, WEST RICHLAND, WA 99353

Comments:

Tax No./Parcel No. 105981020002003

Plat/Block/Lot MORTON'S PLAT. THAT PORTION OF LOT 2 LYING EASTERL

Acreage 0.063

Supplemental Map(s) \_\_\_\_\_

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Township/Range/EW	Section	1/4 Sec	1/4 1/4 Sec	County	Quadrangle
T09R28E	05			Benton	RICHLAND

---

## Coordinate Reference

Easting: 1934629

Northing: 354098

Projection: Washington State Plane South

Datum: HARN (feet)

## Identification

---

Survey Name: HRA 2339 Yakama Gateway

Date Recorded: 12/15/2014

Field Recorder: Perrin, Natalie

Owner's Name:

Owner Address:

City:

State:

Zip:

Classification: Building

Resource Status:

Comments:

Survey/Inventory

Within a District? No

Contributing? No

National Register:

Local District:

National Register District/Thematic Nomination Name:

Eligibility Status: Not Determined - SHPO

Determination Date: 1/1/0001

Determination Comments:



# Historic Inventory Report

## Description

Historic Use: Domestic - Single Family House	Current Use: Domestic - Single Family House		
Plan: Rectangle	Stories: 1.5	Structural System: Unknown	
Changes to Plan: Extensive	Changes to Interior: Unknown		
Changes to Original Cladding: Extensive	Changes to Windows: Extensive		
Changes to Other:			
Other (specify):			
Style:	Cladding:	Roof Type:	Roof Material:
Modern - Minimal Traditional	Veneer - Stucco	Hip	Asphalt / Composition
Foundation:	Form/Type:		
Concrete - Poured	Single Family		

## Narrative

Study Unit	Other	
None		
Date of Construction:	1950 Built Date	Builder:
		Engineer:
		Architect:

Property appears to meet criteria for the National Register of Historic Places: No

Property is located in a potential historic district (National and/or local): No

Property potentially contributes to a historic district (National and/or local): No

Statement of Significance: Property was surveyed from the public right of way (ROW) at a reconnaissance level. Only preliminary background research was conducted. As such, property was not evaluated under Criteria A, B, or D. HRA recommends the building not eligible for listing under Criterion C, as it does not embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic details.

Description of Physical Appearance: Constructed in 1950, this single-story minimal traditional has been extensively modified. The building is clad in stucco siding, and features vinyl windows and modern doors throughout. An attached, one-and-one-half-story garage addition is located on the east and north face.

Major Bibliographic References:

## Photos



Viewing northwest  
Southeast oblique  
2014



Viewing southwest  
Northeast oblique  
2014



Viewing south  
North face  
2014



Viewing south  
North face  
2014



# Historic Inventory Report

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## Location

---

Field Site No. \_\_\_\_\_ DAHP No. \_\_\_\_\_

Historic Name:

Common Name:

Property Address: 3901 FALLON, WEST RICHLAND, WA 99353

Comments:

Tax No./Parcel No. 105982030001005

Plat/Block/Lot REPLAT KRAMER ADDITION BLK 1 LOT 5

Acreage 0.167

Supplemental Map(s) \_\_\_\_\_

Township/Range/EW	Section	1/4 Sec	1/4 1/4 Sec	County	Quadrangle
T09R28E	05			Benton	RICHLAND

## Coordinate Reference

Easting: 1934034

Northing: 354765

Projection: Washington State Plane South

Datum: HARN (feet)

## Identification

---

Survey Name: HRA 2339 Yakama Gateway

Date Recorded: 12/15/2014

Field Recorder: Perrin, Natalie

Owner's Name:

Owner Address:

City:

State:

Zip:

Classification: Building

Resource Status:

Comments:

Survey/Inventory

Within a District? No

Contributing? No

National Register:

Local District:

National Register District/Thematic Nomination Name:

Eligibility Status: Not Determined - SHPO

Determination Date: 1/1/0001

Determination Comments:



# Historic Inventory Report

## Description

Historic Use: Domestic - Single Family House	Current Use: Domestic - Single Family House		
Plan: Rectangle	Stories: 1		
Changes to Plan: Unknown	Structural System: Platform Frame		
Changes to Original Cladding: Extensive	Changes to Interior: Unknown		
Changes to Other:	Changes to Windows: Moderate		
Other (specify):			
Style:	Cladding:	Roof Type:	Roof Material:
Ranch	Veneer - Vinyl Siding	Gable - Side Gable	Asphalt / Composition
Foundation:	Form/Type:		
Concrete - Poured	Single Family		

## Narrative

Study Unit	Other
None	
Date of Construction:	1950 Built Date
	Builder:
	Engineer:
	Architect:

Property appears to meet criteria for the National Register of Historic Places: No

Property is located in a potential historic district (National and/or local): No

Property potentially contributes to a historic district (National and/or local): No

Statement of Significance: Property was surveyed from the public right of way (ROW) at a reconnaissance level. Only preliminary background research was conducted. As such, property was not evaluated under Criteria A, B, or D. HRA recommends the building not eligible for listing under Criterion C, as it does not embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic details.

Description of Physical Appearance: This one-story modified ranch features a side gable roof. The building is clad in vinyl siding and features a combination of original (single-light wood sash) and vinyl windows throughout. A series of attached shed roof additions is located on the north and east face.

Major Bibliographic References:



## Photos

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Viewing south  
North face  
2014



Viewing west  
East face  
2014



Viewing southeast  
Partial northwest oblique  
2014



# Historic Inventory Report

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## Location

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Field Site No. \_\_\_\_\_ DAHP No. \_\_\_\_\_  
Historic Name: \_\_\_\_\_  
Common Name: Benton County Diking District #1, West Richland Levee System  
Property Address: xxx Butte Ct, West Richland, WA  
Comments: \_\_\_\_\_  
Tax No./Parcel No. \_\_\_\_\_  
Plat/Block/Lot \_\_\_\_\_  
Acreage \_\_\_\_\_  
Supplemental Map(s) \_\_\_\_\_

Township/Range/EW	Section	1/4 Sec	1/4 1/4 Sec	County	Quadrangle
T09R28E	05			Benton	RICHLAND

## Coordinate Reference

Easting: 1934847  
Northing: 354032  
Projection: Washington State Plane South  
Datum: HARN (feet)

## Identification

---

Survey Name: HRA 2339 Yakama Gateway Date Recorded: 12/15/2014  
Field Recorder: Perrin, Natalie  
Owner's Name: \_\_\_\_\_  
Owner Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
Classification: Structure  
Resource Status: \_\_\_\_\_ Comments: \_\_\_\_\_  
Survey/Inventory \_\_\_\_\_  
Within a District? No  
Contributing? No  
National Register: \_\_\_\_\_  
Local District: \_\_\_\_\_  
National Register District/Thematic Nomination Name: \_\_\_\_\_  
Eligibility Status: Not Determined - SHPO  
Determination Date: 1/1/0001  
Determination Comments: \_\_\_\_\_



# Historic Inventory Report

## Description

Historic Use: Government - Dam/Levee	Current Use: Government - Dam/Levee		
Plan: Rectangle	Stories: 0	Structural System: Other	
Changes to Plan: Unknown	Changes to Interior: Not Applicable		
Changes to Original Cladding: Not Applicable	Changes to Windows: Not Applicable		
Changes to Other:			
Other (specify):			
Style:	Cladding:	Roof Type:	Roof Material:
None	None	None	None
Foundation:	Form/Type:		
Unknown	Other		

## Narrative

Study Unit	Other	
None		
Date of Construction:	1963 Built Date	Builder:
		Engineer: US Army Corps of Engineers
		Architect:

Property appears to meet criteria for the National Register of Historic Places: No

Property is located in a potential historic district (National and/or local): No

Property potentially contributes to a historic district (National and/or local): No

Statement of Significance: Property was surveyed from the public right of way (ROW) at a reconnaissance level. Only preliminary background research was conducted. As such, property was not evaluated under Criteria A, B, or D. HRA recommends the structure not eligible for listing under Criterion C, as it does not embody the distinctive characteristics of a type, period, or method of construction; represent the work of a master; or possess high artistic details. As an engineering feature, it is not indicative of a type, period, or method of construction, nor is it a work of creative or exceptional significance.

Description of Physical Appearance:

Major Bibliographic References: US Army Corps of Engineers, "Corps completes West Richland levee system periodic inspection." February 18, 2011. Accessed December 18, 2014, <http://www.nwww.usace.army.mil/Media/NewsReleases/tabid/2614/Article/482351/corps-completes-west-richland-levee-system-periodic-inspection.aspx>

## Photos

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Viewing southeast

2014



## Appendix C. Shovel Probe Results

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Table C-1. Shovel Probe Results.

Shovel Probe	Maximum Depth (cm)	Depth (cm): Description— <i>Comments</i>	Cultural Materials
1	52	0-12: Gray-brown sandy loam with root mat and less than 5% gravel.  12-52: Brown-gray, moderately compacted silty sand and gravels. Gravels less than 35%.  Termination at depth.	0-12: Asphalt and concrete chunks, modern trash
2	50	0-8: Gray-brown sandy loam with root mat and less than 5% gravel.  8-30: Gray fine sand with less than 5% gravel.  30-50: Gray sand with 75% rounded and angular gravel.  Termination at depth.	8-50: Plastic, metal tube, asphalt chunk
3	60	0-30: Brown-gray, compacted sand and gravels, fine root zone. Less than 30% round to subangular gravels, pebbles to small cobbles.  30-60: Pale gray-brown, very fine to fine sandy gravels. Increasing small to medium cobbles with depth.  Termination at depth.	0-60: Modern trash, including 2 brown bottle glass, 1 green bottle, 1 rusted spark plug
4	50	0-50: Gray medium to coarse sand with 75% rounded gravel.  Termination at depth.	None
5	65	0-10: Brown silty sand and gravels.  10-25: Imported angular gravel – medium to large angular cobbles.  25-65: Loose to moderately compacted gray-brown silty sand.  Termination at depth.	10-25: Modern trash, construction fill – riprap, asphalt chunks
6	52	0-45: Gray-brown silty loam with less than 5% gravel.  45-52: Gray-brown silty loam with 75% gravel.  Termination at depth.	None



Table C-1. Shovel Probe Results.

Shovel Probe	Maximum Depth (cm)	Depth (cm): Description— <i>Comments</i>	Cultural Materials
7	63	0-63: Massive dark gray to olive-gray, fine and moderately compact sandy silt, roots throughout.  Terminated at boulder obstruction.	0-10: Plastic and aluminum
8	53	0-53: Gray brown silty loam with less than 5% gravel and 10-15% roots.  Terminated at roots and depth.	15 cm: Plastic bag
9	56	0-14: Brown silty sand below sod layer, rooty.  14-48: Gray-brown, loose, medium to fine silty sand.  48-56: Gravelly silty sand, round to subangular gravels  Termination at gravel compaction and depth.	None
10	33	0-33: Gray-brown silty loam with 75% rounded gravel and 5% roots.  Terminated at asphalt.	None
11	35	0-20: Brown silty sand with grass sod, small gravels and pebbles.  20-35: Large cobbles in silty sand.  Terminated due to large cobbles.	None
12	53	0-20: Compact gravelly silty sand, less than 35% unsorted gravels.  20-53: Gray-brown silty sand and gravels.  Termination at depth and groundwater.	None
13	61	0-61: Gray-brown sandy silty loam with 25% gravel and less than 5% roots.  Termination at depth.	0-61: Brown and clear bottle glass with screw tops, styrofoam, metal pin
14	60	0-15: Duff and loose disturbed light brown sand	None

Table C-1. Shovel Probe Results.

Shovel Probe	Maximum Depth (cm)	Depth (cm): Description— <i>Comments</i>	Cultural Materials
		with few cobbles. 15-60: Loose disturbed light gray sand and gravels. Termination at depth.	
15	43	0-42: Dark olive-gray, fine to medium sandy silt, many small roots. Terminated at dense root zone.	0-42: 2 golf balls on surface, appliances and other modern trash on surface
16	50	0-20: Gray-brown silty loam with less than 1% gravel and less than 5% roots. 20-50: Gray silty loam with less than 1% gravel and less than 5% roots. Termination at depth.	None
17	55	0-15: Dark brown clay loam with tall reeds, grasses, some roots. 15-55: Gray-brown sandy clay, very wet. Termination at depth.	0-15: 4 golf balls and brown glass fragments
18	50	0-20: Brown, loose, medium silty sand below sod layer, dense fine rootlets, and less than 25% round to angular unsorted gravels. 20-50: Pale gray-brown gravelly silty sand, very well drained. Termination at depth.	0-20: plastic
19	50	0-50: Gray-brown silty loam with 40-50% rounded gravel. Termination at depth.	None
20	60	0-60: Dark gray-brown silty sand, some few cobbles throughout. Termination at depth.	0-60: clear glass and plastic fragments





February 2, 2015

Ms. Sarah Thirtyacre  
Recreation & Conservation Office  
PO Box 40917  
Olympia, Washington 98504-0917

Re: City of West Richland Gateway Project  
*RCO# N.A.*  
Log No.: 061013-03-RCFB

Dear Ms. Thirtyacre:

Thank you for contacting our Department pursuant to Executive Order 05-05. We have reviewed the professional archaeological survey reports you provided for the proposed City of West Richland Gateway Project along the Yakima River, Benton County, Washington.

We concur with the determination of no cultural resource impacts.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under EX05-05.

In the event that archaeological or historic materials are discovered during project activities, work in the immediate vicinity must stop, the area secured, and this department notified.

These comments are based on the information available at the time of this review and on behalf of the State Historic Preservation Officer in compliance with Executive Order 05-05. Should additional information become available, our assessment may be revised, including information regarding historic properties that have not yet been identified. Thank you for the opportunity to comment and a copy of these comments should be included in subsequent environmental documents.

Sincerely,

Robert G. Whitlam, Ph.D.  
State Archaeologist  
(360) 586-3080  
email: [rob.whitlam@dahp.wa.gov](mailto:rob.whitlam@dahp.wa.gov)



Natural Resources Building  
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Web site: [www.rco.wa.gov](http://www.rco.wa.gov)

STATE OF WASHINGTON

RECREATION AND CONSERVATION OFFICE

January 30, 2015

Mr. Robert Whitlam, Ph.D.,  
Department of Archeology and Historic Preservation  
1063 South Capital Way, Suite 106  
Olympia, WA 98501

Re: 2012 Recreation and Conservation Funding Board Project for City of West Richland, DAHP  
Log No.: 061013-03-RCFB

Dear Dr. Whitlam, *Rob* :

Attached is the completed Cultural Resources Survey for the City of West Richland's Yakima Riverfront Park (aka Yakima River Gateway Project) development project funded through the Recreation and Conservation Office's (RCO). The RCO initiated formal consultation with the Washington State Department of Archaeology and Historic Preservation (DAHP), the Confederated Tribes of the Umatilla Indian Reservation (Umatilla), and the Confederated Tribes and Bands of the Yakama Nation (Yakama). The Umatilla and DAHP requested that a survey be conducted for the project area and requested monitoring of ground disturbing activities. This development project is being funded through the Recreation and Conservation Funding Board (RCFB), there is currently no federal involvement and is therefore being reviewed under GEO 05-05.

This project is located in within the City of West Richland in Benton County along the Yakima River. More specifically, the project area includes a portion of the west bank of the Yakima River along Fallon Drive (Dr.) from West VanGiesen/SR 224 to the West Richland Golf Course. The Project as currently proposed follows a 100-foot wide and 0.25-mile long corridor along the western bank of the Yakima River. Project elements include, but are not limited to, the pathway, landscaping, lighting, City entrance sign, sidewalks, restrooms, non-motorized river access, accessibility, interpretive signs, asphalt paving, and other improvements. A new parking area and restroom facility is proposed at the southern terminus of the trail, with the reconfiguring of the existing storm facility and removal of the current pump station. A portion of Fallon Dr. will be replaced with a park just north of SR 224.

Prior to archaeological fieldwork, the City, in coordination with the RCO, sent a letter and Project area map to the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and the Yakama Nation explaining the proposed project elements and HRA's cultural resources study (Appendix A). To date, the RCO (and the City) has not received comments from the Yakama. As requested by the RCO, HRA archaeologist Steven Dampf followed the letter with an email and telephone call to the CTUIR tribal representative to gather information regarding traditional cultural use areas and historic land use in the project area. Carey Miller (personal communication 2014), Tribal Historic Preservation Officer (THPO) for the CTUIR, said that she had no specific comments on the



proposed Project, but emphasized the CTUIR should be contacted if any cultural resources were identified during the field investigation.

HRA conducted archaeological inventory of the AI in December 2014. HRA first conducted archaeological monitoring of geotechnical excavations, including four mechanically excavated trenches and three hand augers, in the AI. HRA archaeologists then conducted a pedestrian and subsurface inventory of the AI. The ground surface was examined for visible artifacts or cultural features older than 50 years, and 20 subsurface probes were excavated in unpaved and accessible portions of the AI. **No prehistoric or historic-era cultural materials were found.**

Despite the environmental and archival research indicating that there is a high to very high probability of encountering archaeological resources in this type of environment, the field investigations show the AI to be disturbed from modern construction activities, including the construction of the roadways, housing developments, and dumping of trash on the side of the roadway. Unless the project is redesigned, **no further cultural resources work is recommended.**

The survey conducted by HRA, also evaluated fifteen buildings, structures, or objects (BSOs) greater than 45 years old were identified adjacent to or within the larger project area (AI). However, these structures are not within the project area being funded with the RCO grant and are therefore outside our purview. While HRA recorded these structures on HPI forms (Appendix B), RCO is not asking for a determination for these structures since they are outside of our project area.

Based upon the survey recommendations, RCO intends to issue the grant recipient a "notice to proceed" with ground disturbing work. As always, Inadvertent Discovery language is included in the RCO grant contract. If you need additional information, you can reach me at (360) 902-3082 or [sarah.thirtyacre@rcowa.gov](mailto:sarah.thirtyacre@rcowa.gov). Thank you for your assistance.

Sincerely,

A handwritten signature in cursive script that reads "Sarah Thirtyacre". The signature is written in black ink and is positioned below the word "Sincerely,".

Sarah Thirtyacre, Senior Grants Manager and Cultural Resources Program Coordinator

Natural Resources Building  
1111 Washington St. S.E.  
Olympia, WA 98501

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Olympia, WA 98504-0917



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STATE OF WASHINGTON

RECREATION AND CONSERVATION OFFICE

January 30, 2015

Ms. Carey Miller, Archaeologist/THPO  
Confederated Tribes of the Umatilla Indian Reservation  
46411 Timine Way  
Pendleton, Oregon 97801

Re: 2012 Recreation and Conservation Funding Board Project for City of West Richland, DAHP  
Log No.: 061013-03-RCFB

Dear Ms. Miller,

Attached is the completed Cultural Resources Survey for the City of West Richland's Yakima Riverfront Park (aka Yakima River Gateway Project) development project funded through the Recreation and Conservation Office's (RCO). The RCO initiated formal consultation with the Washington State Department of Archaeology and Historic Preservation (DAHP), the Confederated Tribes of the Umatilla Indian Reservation (Umatilla), and the Confederated Tribes and Bands of the Yakama Nation (Yakama). The Umatilla and DAHP requested that a survey be conducted for the project area and requested monitoring of ground disturbing activities. This development project is being funded through the Recreation and Conservation Funding Board (RCFB), there is currently no federal involvement and is therefore being reviewed under GEO 05-05.

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Despite the environmental and archival research indicating that there is a high to very high probability of encountering archaeological resources in this type of environment, the field investigations show the AI to be disturbed from modern construction activities, including the



construction of the roadways, housing developments, and dumping of trash on the side of the roadway. Unless the project is redesigned, **no further cultural resources work is recommended.**

Based upon the survey recommendations, RCO intends to issue the grant recipient a "notice to proceed" with ground disturbing work. As always, inadvertent discovery language is included in the RCO grant contract. Please let me know if you need additional information, or if you would recommend any further archaeological work or monitoring be conducted. You can reach me at (360) 902-3082 or [sarah.thirtyacre@rco.wa.gov](mailto:sarah.thirtyacre@rco.wa.gov). Thank you for your assistance.

Sincerely,

A handwritten signature in black ink, appearing to read "Sarah Thirtyacre". The signature is fluid and cursive, with a long horizontal stroke at the end.

Sarah Thirtyacre, Senior Grants Manager and Cultural Resources Program Coordinator



## Thirtyacre, Sarah (RCO)

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**From:** Thirtyacre, Sarah (RCO)  
**Sent:** Tuesday, February 24, 2015 1:45 PM  
**To:** careymiller@ctuir.org  
**Cc:** sdampf@hrassoc.com; Moxham, Laura (RCO); Cole, Adam (RCO)  
**Subject:** City of West Richland-Yakima Gateway

Carey-

Sorry for the delayed response. I had a good conversation last week with **Steven Dampf the archaeologist with Historical Research Associates (HRA) that is working on this project.** He explained that the City of West Richland, following the geo-tech study on the potential trail alignment, decided to abandon pursuing developing of the north portion of the trail. The results of the boring showed environmental /engineering issues with the existing dike/berm. The City did not feel that these could be resolved at this time. Therefore, the City plans to only proceed with the portion of trail depicted in the APE that was included in the Cultural Resources Survey (CRS). RCO will be clear with the City when it comes time for us to issue a notice to proceed, that our cultural resources consultation was limited to the area depicted in the CRS.

In regards to the area on the south side of the bridge, the City currently intends to install a parking area and bathroom in this location. This City staff and the engineering company assigned to the project have indicated that the ground disturbing activities in this area will not extend beyond the previously disturbed soils and that the trenching to hook the restroom up to the sewer will not exceed 3 feet in depth.

Please let me know if you need any additional information or if you would recommend any further investigation or monitoring of this project area. Inadvertent Discovery language is included on our project contract, as well as in the CRS. You can reach me at 360-902-0243 or via email. Steven can be reached at *p* 509.624.0441 | *c* 509.590.6862 | [sdampf@hrassoc.com](mailto:sdampf@hrassoc.com)

Sincerely-Sarah Thirtyacre

Cultural Resources Coordinator & Senior Grants Manager

Recreation and Conservation Office

## Thirtyacre, Sarah (RCO)

---

**From:** Carey Miller <CareyMiller@ctuir.org>  
**Sent:** Thursday, February 12, 2015 10:35 AM  
**To:** Thirtyacre, Sarah (RCO)  
**Cc:** Moxham, Laura (RCO); Whitlam, Rob (DAHP)  
**Subject:** RE: Yakima River Gateway - Cultural Resources Report  
**Attachments:** west richland\_Yakima Gateway Geotech\_cultural map.pdf

Sarah,  
Thank you for the cultural resource report. The digital version is great.

I have a couple of questions. The geotechnical map that I received in December 2014 (attached) shows the project area extending much farther north than what was investigated in the HRA's cultural resource report. Am I to assume that only the southern portion as reflected in the HRA report is being funded and constructed?

It is unclear based on the information provided if the restrooms and other items that require deeper excavation will be placed in the areas where the geotechnical test trenching occurred. This testing indicated that disturbed sediments were encountered to at least a depth of 1 meter or more. Or will the restrooms and associated infrastructure be placed in areas that were only tested to about 50 cm in depth? These areas may have intact deposits at a greater depth. It may be the CTUIR's recommendation to have cultural resource monitor on-site if deeper excavations (such as the water lines) are to occur in areas that may be intact.

Thank you ,  
Carey

Carey L. Miller  
Tribal Historic Preservation Officer/Archaeologist  
Confederated Tribes of the Umatilla Indian Reservation  
Cultural Resources Protection Program  
46411 Timine Way, Pendleton, OR 97801  
ph. (541)429-7234  
[careymiller@ctuir.org](mailto:careymiller@ctuir.org)  
Office Hours: Monday-Thursday

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**From:** Thirtyacre, Sarah (RCO) [<mailto:Sarah.Thirtyacre@rco.wa.gov>]  
**Sent:** Friday, January 30, 2015 2:31 PM  
**To:** Carey Miller  
**Cc:** Moxham, Laura (RCO)  
**Subject:** FW: Yakima River Gateway - Cultural Resources Report

Carey-  
Thank you for participating in the consultation efforts for the Yakima River Gateway Project. Attached you will find our transmittal letter and the completed Cultural Resources Survey for the City of West Richland's Yakima River Gateway Project. A similar letter (along with the survey) was transmitted to Rob Whitlam at DAHP. Please let me know if you need any additional information, or if you recommend any further action.

*Sarah Thirtyacre*  
*Senior Grants Manager and Cultural Resources Coordinator*


Recreation and Conservation Office

1111 Washington St SE Olympia, WA 98504

360-902-0243

[sarah.thirtyacre@rco.wa.gov](mailto:sarah.thirtyacre@rco.wa.gov)

The opinions expressed by the author are his or her own and are not necessarily those of the Confederated Tribes of the Umatilla Indian Reservation. The information, contents and attachments in this email are Confidential and Private.

**From:** Bryan Cole [bcole@mackaysposito.com](mailto:bcole@mackaysposito.com)   
**Subject:** Fwd: FW: Yakima River Gateway - Geotechnical Drilling Explorations for the proposed floodwall  
**Date:** March 14, 2016 at 3:31 PM  
**To:** anderenv [anderenv@q.com](mailto:anderenv@q.com)

BC

**Bryan Cole, ASLA, CLARB, PLA**  
DIRECTOR OF LANDSCAPE ARCHITECTURE AND PLANNING

P 509 619 7092 M 360 281 0968  
7601 W Clearwater Ave, Suite 405  
Kennewick, WA 99336

**MacKay**  **Sposito**

----- Forwarded message -----

**From:** Thirtyacre, Sarah (RCO) <[Sarah.Thirtyacre@rco.wa.gov](mailto:Sarah.Thirtyacre@rco.wa.gov)>  
**Date:** Mon, Apr 6, 2015 at 12:03 PM  
**Subject:** FW: Yakima River Gateway - Geotechnical Drilling Explorations for the proposed floodwall  
**To:** Bryan Cole <[bcole@mackaysposito.com](mailto:bcole@mackaysposito.com)>

I sent this email to the archaeologist at the Walla Walla office of the ACOE last week. He is going to make contact with Herb Bessey of the Corp to get everyone on the same page. I will let you know what I hear from him.

## Sarah Thirtyacre

Senior Grants Manager and Cultural Resources Coordinator

Recreation and Conservation Office

1111 Washington St SE Olympia, WA 98504

[360-902-0243](tel:360-902-0243)

[sarah.thirtyacre@rco.wa.gov](mailto:sarah.thirtyacre@rco.wa.gov)

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**From:** Thirtyacre, Sarah (RCO)  
**Sent:** Friday, April 03, 2015 10:47 AM  
**To:** '[scott.m.hall@usace.army.mil](mailto:scott.m.hall@usace.army.mil)'  
**Subject:** FW: Yakima River Gateway - Geotechnical Drilling Explorations for the proposed floodwall

Scott-

Nice to speak with you today. Attached I have included the CR Survey and transmittal letter to DAHP and the CTUIR. I have also included DAHP's response and my email correspondence with Carey Miller of the CTUIR. Below, I have included Bryon Cole's (consultant with McKay-Sposito) most recent email regarding the levy work that will require additional excavation. The APE for the project area can be found on page 4 of the report. I do not have a map that specifically identifies where the levy work will

found on page 4 of the report. I do not have a map that specifically identifies where the levy work will occur, however, I am assuming that Herb Bessey may have that information.

Due to the nature of this site, and the interest expressed by the Tribe, I want to be very clear about the regulatory context that we are working within before I send further correspondence to the parties. Also, the City plans to put in a water access site (see page 5 of the concept plans) and I am still not entirely convinced that a Corp permit will not be required.

Thanks so much for your assistance on this project. As I mentioned on the phone today, it may be beneficial to get all the parties together on a conference call to review the elements of this project.

## Sarah Thirtyacre

Senior Grants Manager and Cultural Resources Coordinator

Recreation and Conservation Office

1111 Washington St SE Olympia, WA 98504

[360-902-0243](tel:360-902-0243)

[sarah.thirtyacre@rco.wa.gov](mailto:sarah.thirtyacre@rco.wa.gov)

**From:** Bryan Cole [mailto:[bcole@mackaysposito.com](mailto:bcole@mackaysposito.com)]

**Sent:** Wednesday, April 01, 2015 9:55 AM

**To:** Thirtyacre, Sarah (RCO)

**Cc:** Alison Greene

**Subject:** Yakima River Gateway - Geotechnical Drilling Explorations for the proposed floodwall

Sarah,

Thanks for contacting me on this activity I appreciate you following up to ensure that we are in compliance with our RCO requirements. As requested below is a brief explanation of the drilling activities that the US Army Corps of Engineers is requiring as part of the design of the flood wall in the existing dike.

During our initial meeting with the Corps we discussed the need to provide an ADA ramp on the existing dike to provide access from underneath the south side of the bridge to the proposed parking lot. The ADA ramp will require walls to be constructed due to the grades and the existing dike will be modified. This triggered the need for geotechnical drilling investigations to be conducted on the existing dike so that a floodwall could be designed. This drilling activity will require a core sampling through approximately 15' of rip rap (dike itself) and a maximum of 3' into the existing soil.

We currently do not have the drilling activities scheduled as the Corps is reviewing our drilling plan. Once we have approval we would like to start the geotechnical investigations as soon as possible. Let me know if you have any questions or concerns and of course we will need to make sure there are no concerns on your end before we proceed.

Thanks,

Below is the contact at Walla Walla for your use.

Herb Bessey, P.E.  
Levee Safety Program Manager  
U.S. Army Corps of Engineers  
Walla Walla District  
[509-527-7144](tel:509-527-7144)

[herb.g.bessey@usace.army.mil](mailto:herb.g.bessey@usace.army.mil)

**Bryan Cole, ASLA, CLARB, PLA**  
DIRECTOR OF LANDSCAPE ARCHITECTURE AND PLANNING

P 509 619 7092 M 360 281 0968  
7601 W Clearwater Ave, Suite 405  
Kennewick, WA 99336

MacKay  Sposito



February 2, 2015

Ms. Sarah Thirtyacre  
Recreation & Conservation Office  
PO Box 40917  
Olympia, Washington 98504-0917

Re: City of West Richland Gateway Project  
*RCO# N.A.*  
Log No.: 061013-03-RCFB

Dear Ms. Thirtyacre:

Thank you for contacting our Department pursuant to Executive Order 05-05. We have reviewed the professional archaeological survey reports you provided for the proposed City of West Richland Gateway Project along the Yakima River, Benton County, Washington.

We concur with the determination of no cultural resource impacts.

We would appreciate receiving any correspondence or comments from concerned tribes or other parties that you receive as you consult under EX05-05.

In the event that archaeological or historic materials are discovered during project activities, work in the immediate vicinity must stop, the area secured, and this department notified.

These comments are based on the information available at the time of this review and on behalf of the State Historic Preservation Officer in compliance with Executive Order 05-05. Should additional information become available, our assessment may be revised, including information regarding historic properties that have not yet been identified. Thank you for the opportunity to comment and a copy of these comments should be included in subsequent environmental documents.

Sincerely,



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Robert G. Whitlam, Ph.D.  
State Archaeologist  
(360) 586-3080  
email: [rob.whitlam@dahp.wa.gov](mailto:rob.whitlam@dahp.wa.gov)

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State of Washington • **Department of Archaeology & Historic Preservation**  
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May 18, 2015

Ms. Alison Greene  
City of West Richland  
3801 Van Giesen Street  
West Richland, WA 99353

RE: City of West Richland's "Developing Yakima Rivershore and Trail" (#12-1566)

Dear Ms. Greene:

This letter serves as your notice to proceed with ground disturbing activities for the following actions:

- Trenching to facilitate utility hook-ups for the parking area amenities
- Soil cuts into the existing storm water retention facility
- Ground disturbing activities along the shoreline to facilitate the construction of the boat launch
- Drilling activities related to geo-technical boring into the dike

All work being conducted must be in compliance with the attached monitoring and inadvertent discovery plan. The plan was reviewed and agreed upon by all consulting parties.

Sincerely,

*Sarah Thirtyacre*

Sarah Thirtyacre  
Senior Grants Manager and Cultural Resources Program Coordinator

Enclosures

